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USSR Report

CHEMISTRY

No. 67



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USSR REPORT

CHEMISTRY

No. 67

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DYNAMICS OF ADSORPTION OF ONE SUBSTANCE FOR NON-LINEAR ISOTHERMS IN THE CASE OF A CLOSED ISOLATED SYSTEM. II. EXTERNAL DIFFUSION KINETICS AND ARBITRARY BROKEN ISOTHERMS OF ADSORPTION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 53 No 9 Sep 79 pp 2377-2379
manuscript received 16 Jan 79

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[Abstract] Reference is made, at the outset, to a series of three differential equations for a broken adsorption isotherm and external diffusion kinetics. These equations, which are set down, are taken essentially from an earlier paper by Zolotarev (same journal, pp 2374-2376): they describe the balance of mass of a mixture in an adsorption filter; the balance of mass of an adsorbed mixture in a certain volume; and, the kinetics of the adsorption. In the earlier paper a mathematical analysis was made of the general equations of the dynamics of adsorption of one substance in a closed isolated system for arbitrary non-linear isotherms. In the present paper the analysis deals with a fragmented-linear, i.e., an arbitrary broken isotherm. An element of the earlier (Kolin, et al., 1975) equations is $c(t)$ which is the concentration of the adsorbed substance in the adsorption filter and in the space and the authors indicate that the mathematical solution of the task, the expression for $c(t)$, is given by two equations they have derived, for $t \leq t_*$ and $t \geq t_*$. References 3 (Russian).

[24-8586]

CHEMICAL INDUSTRY CONSTRUCTION DELAYS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Oct 79 p 2

[Article by I. Volkov, head of the Section for Organizing Introduction of Developments Into Production, and N. Semykin, senior scientific associate of the VNIPIPAV Institute: "On the Basis of a Unified Plan"]

[Text] We read with interest the article by A. Polyanin in the 6 July issue, "An Intermediary Is Needed." It raised a question of primary importance that has been worrying both production workers and scientific associates for many years: how can the introduction of useful, sometimes highly efficient developments be accelerated?

The Section for Organizing Introduction of Developments Into Production is in its second year of operation at our All-Union Scientific Research and Planning Institute for Surfactants (VNIPIPAV). In its portfolio are over 50 scientific developments, completed and ready for use. It was approximately like this even at the moment when the section was established. All right, has the introduction mechanism been idling for the entire two years? That cannot be said. A number of works have been introduced. The portfolio itself has been supplemented, however! There was no sharp reduction in the projects in progress. This makes one wonder: why?

This is the section that we set up, but have any major steps been taken on the part of production concerning the developments lying on the shelves? Unfortunately, this question must be answered in the negative. The situation is just the same as three, as five years ago.

There are two classes of obstacles: objective and subjective. Included in the first is the rigid production plan, when it is hard to find a "free period" to install new equipment or master a process. Most often this requires shutting down the plant, shop or line. That is, the plan must be corrected (toward its reduction!). No one can be found who wants to appeal once more about this to the All-Union Production Association, ministry or Gosplan. The promising development is put aside or even into the archives. There are many examples. Here are some characteristic ones.

At one of the chemical plants the testing of a sulfonator was nearing the end, and real success was in sight. Certain modifications were required. They were made within the periods specified by the records, but by that time the apparatus had already been dismantled. "We have a plan, and there is no time to bother with you," the comrades said to us.

Similarly, experimental-industrial testing was completed for a new method of sulfuric acid alcohol sulfation at the Shebekino Chemical Plant. The innovation promised a saving of half a million. It was a question of a minor finishing hook-up--a heat exchanger had to be installed. Once again the familiar words about the plan were heard--the obstacle to the innovation.

Or take neonols--the basis for many developments in commercial detergents, including Ektinol, which could replace the preparation, Nordal, purchased for hard currency, at the VAZ [Volkhov Aluminum Plant]. It is the basis of a preparation to rid the sea surface of polluting oil film. Our chemical is greatly superior to the American Keroxite-9527, and moreover, is half the price. We could provide drilling fluids that would raise the gas yield from beds by 15 percent and would reduce the hardness of the rock when drilling blast holes (the yearly economic saving for the Lebedin Mining and Concentrating Combine approaches 290,000 rubles)....

We could also provide many other preparations with exceeding useful properties, if the Salavat Petrochemical Combine would undertake the output of neonols. The directors of this combine, however, stubbornly refuse to organize its production. The motif is the same: "Even without that the plan is overloaded."

The fate of the developments is often determined by a manpower shortage among the construction workers. At the Volgodonsk Chemical Plant imeni 50-Letiya VLKSM a small unit worth less than 25,000 rubles was installed a year late. For the same reason the launching of a very important shop for purified synthetic aliphatic acids has been carried over since 1974, and when it will take place--no one knows. The force of the adverse effect of this factor could be perceptibly reduced if during the technical-economic substantiation of the construction the actual potentials for the construction base were numbered among the basic indicators. This will be the correct conclusion drawn from the lessons nearly always taught by the construction workers.

One more stumbling block is the buyer's (or contractor's) lack of necessary equipment, instruments, etc. They put in what they have on hand. It does not matter that a propellor from a slow-moving air vehicle is put on a supersonic plane. But--they put it on. The idea is discredited, as it was, for example, at the unit mentioned at Volgodonsk.

All of this places a barrier on the path of innovations.

Subjective factors are also fully in operation.

As is known, at times there are quite broad tolerances among the standards for the output. Perhaps a slightly better product will be put out, and perhaps--a slightly worse one. Both are within the limits of the standard. The Shebekino Chemical Plant makes use of this fact when producing synthetic aliphatic acids (they replace natural fats). A long obsolete unit is in operation here for vat distillation of the commercial product that is no longer found at a single related enterprise. The product with inferior consumer properties is sold in accordance with the unified wholesale price, ensuring higher technical-economic indicators than at other enterprises--for the supplier, of course. The same thing can be said of the poor-quality

alpha-olefins of the Novokiybyshev Petroleum Refinery, etc. Does the management of these and certain other enterprises really not know that the national economy has taken a course toward efficiency and quality?

The examples, as is clear to everyone, are on various planes. They have, however, one undoubted common feature: putting into effect scientific (or scientific-design) developments in industry at present is an exclusively voluntary affair. If you want to--put it into operation. If you don't want to--do as you like. For fulfillment of the sales plan, and now--for fulfillment of the agreements with the plant director--there is a strict demand, but there is no such demand for maximum use of the achievements of scientific and technical progress.

The Decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Intensifying the Effect of the Economic Mechanism on Increasing Production Efficiency and Raising Work Quality" ensures the solution to many of the problems of principle in the work of the country's economic organism. Included among them are those relating directly to our topic. For example, the production plans specify putting into effect the achievements of scientific-technical progress and financing them. Provision is made for incentive for the workers of the enterprises, all-union production associations, ministries and departments to introduce new equipment and the output of new commodities, as well as the obligation to include the new developments into the long-term, five-year and yearly plans of the ministries that are the suppliers and consumers under the aegis of the State Scientific and Technical Committee, USSR Gosplan and USSR Gosstroy.

The decree, however, requires that we give thought to working out the details of the economic mechanism being improved. Indeed, the plan for new equipment existed before, as well. The demand for its fulfillment is increasing--this is good. The plan, though, cannot remain as before! After all, it is essentially a mini-plan. It is far from encompassing the developments that scientific and technical thought is offering industry. We feel that the plan for new equipment should be oriented toward maximum use of innovations.

Of course, the plan must not be blown up endlessly. We can suggest a criterion for the minimum: protection of the developments by authorship certificates. It must be done so that all developments of this type must be obligatorily included in the plan for new equipment. Incidentally, the decree too makes it obligatory to give preference to the use of developments protected by authorship certificates, and specifies measures for material incentive.

There is one more step that is necessary, however, so that the innovations do not die on shelves in archives. The plan should be unified, a state plan, on a level with the production plan, obligatory for all the ministries and departments concerned with the production and consumption of the product or item.

With respect to our conditions, the state plan for introduction (we assume that it will be given that precise title) should be a law both for the institute and for the plant, and for the all-union production association and for the ministry. Only planned operations coordinated in this way will lead to success.

[32-12151]

AMMONIA PIPELINE LEG COMPLETED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Oct 79 p 1

[Article by L. Borisov: "Rates and Quality"]

[Text] The southern leg of the pipeline from Gorlovka to Odessa has been successfully filled with liquid ammonia. Today the entire 310 kilometers of the main pipeline were filled with the product. Yesterday the ammonia reached the loading docks.

The construction workers of the Ministry of Construction of Petroleum and Gas Industry Enterprises have performed a large amount of construction and installation work in the Donbass and the Dnepr region. Dozens of obstacles have been successfully overcome: river, railroad and highway crossings have been constructed. The true culmination of engineering ideas is the guy-rope bridging of the Dnepr. It is about one kilometer long. About 12 special cables secure the bridge above the river channel. It was built in seven months--twice as fast as was planned. The brigades of Honored Construction Worker of the RSFSR from the Soyuzmontazhgaz Trust Mikhail Sukharev and of Aleksandr Gavrilin distinguished themselves in erecting the 300-ton pillars, 80 meters high.

High work quality and concern for the reliability of the structure and safety measures when transporting corrosive substances such as ammonia accompanied the high construction rates. The main pipeline at the Dnepr bridge crossing is enclosed in a sturdy casing, into which nitrogen was injected in advance. At the slightest leakage of ammonia (which is virtually excluded) it immediately reacts with the nitrogen and forms a volatile gas--there is no pollution of the river.

A complex automated system is in operation to protect the environment. Reliable instruments have been installed at the pumping stations that transport the product under high pressure to the Grigor'yev liman near Odessa, where the port plant structures have been constructed.

The new main pipeline will be a great help in increasing the efficiency of Ukrainian agriculture. The eight distribution stations constructed along the route traced by the ammonia will deliver valuable fertilizer to the fields of Dnepropetrovskaya, Nikolayevskaya, Khersonskaya and Odesskaya oblasts. In the future the number of these stations will increase to 29. They will provide for the agricultural land resources of Kuybyshevskaya, Saratovskaya, Voronezhskaya, Tambovskaya, Belgorodskaya and Khar'kovskaya oblasts. With the completion of construction of the ammonia pipeline from Tol'yatti to Odessa, in all, the kolkhozes and sovkhoses of the two republics will receive an amount of liquid ammonia that is equivalent to an additional supply of one million tons of nitrogen fertilizers a year.

The first results of the fruitful international collaboration are at hand. The construction project, as is known, is being carried out on the basis of a compensatory agreement with American and French firms, which supply us with equipment and pipes, and in return will obtain the finished product.

The total length of the ammonia pipeline will be over 2,500 kilometers. Right now the work front has been moved forward on its northeastern limb from Tol'yatti to Panyuti. About 900 kilometers of main pipeline have already been welded into the line here. The Ministry of Construction of Petroleum and Gas Industry Enterprises and the Ministry of the Chemical Industry recently adopted measures to accelerate the work rates. Eight comprehensive mechanized flow lines have been sent to the line in addition. This will make it possible to prepare the 540 kilometers of the main section for filling with liquid ammonia before the end of the year.

The Soyuzpodvodgazstroy collective has developed socialist competition to complete the crossings of the Volga-Uzen' rivers and canal ahead of schedule. The underwater construction workers will accomplish the speeded crossing of these obstacles in the near future. Also included in the "workers' relay race" are the collectives of the Mosgazprovodstroy, Lengazspetsstroy and Shchekingazstroy trusts, a number of Ukrainian trusts and the Soyuzintegazstroy Association. The decision has been made to organize a high-speed, expanded assembly of the so-called sectioning posts, in order to run them into the main line by this month. More rigid schedules are being maintained for the installation and mounting of the electric modules and booster stations of the connection.

[32-12151]

12151
CSO: 1841

WEAK NITRIC ACID FIRST MADE AT PRIDONSKOY CHEMICAL PLANT

Moscow STRUTTEL'NAYA GAZETA in Russian 15 Aug 79 p 1

[Article by A. Dzhiyev: "Competition of Workers in 60 Republics, Krays, Oblasts and Cities--First Tons"]

[Text] The past Sunday the first tons of weak nitric acid were produced at the the first stage of the Pridonskoy Chemical Plant. In short order this chemical enterprise sprang up on the outskirts of Rossosh'--a small town verdantly endowed, in Voronezhskaya Oblast. From a long way off can be seen the enormous granulation tower, the columns, the equipment. Stretching for kilometer after kilometer were the trestles of intershop process feed pipelines.

"To build this enterprise," we are told by V. Lomtev, chief of the start-up complex and assistant head of the Voronezh Territorial Construction Administration, "we specially set up a general contracting trust Pridonkhimstroy. Construction and installation work followed a combined schedule. A commitment--to hand over the work front on time to the next workers in line--was singled out as the key point in the integrated competition under the 'Workers' Relay Race.' Installers and workers in other specialized organizations were involved in the effort, not waiting for a hundred-percent construction readiness of the project. So the machinery in the weak nitric acid shop was installed in the building when the incomplete operations registered "zero." The boiler installation of the heat and electric power plant was assembled before there was even the frame of a building. The construction grounds were hooked up to electric power and water on time."

We move on to the ammonium nitrate shop. Here D. Dodukalo's brigade from the Rossosh' Installation Administration of the Yugovostoktekhmontazh Trust assembled the process piping of the ammonium nitrate solution department. At the height of construction this collective struck out with the initiative of stepping up competition for shortening the work schedules at the start-up projects. Models of selfless labor were exhibited by the bricklayers' brigade of L. Rysnyanskaya and the plasterers and painters' brigade of Ye. Sergiyenko.

Numerous innovative working methods were applied in constructing the first start-up complex of the plant.

"Spherical tanks in the liquid ammonia receiving storage area were installed for the first time without a manipulator--on a water cushion," I. Shpital'nik, chief engineer, Yugovostoktekhmontazh Trust, tells us. "Water became a kind of temporary stand on which the enormous 'ball' was easily rotated for its sections to be welded. This halved their assembly time, and with a smaller number of workers. The absorption column was assembled ahead of time while lying flat on the ground and then lifted as a whole to the design position."

The Pridonskoy Chemical Plant is an all-union shock-priority Komsomol project. Erection of the plant was under the constant scrutiny and monitoring of the Voronezh Obkom. Helping the builders were the workers of many industrial enterprises of the city and the oblast. Detachments of "Korchaginets" Komsomol members were dispatched to the most critical sections.

Ammonium nitrate--a valuable fertilizer for the fields--will be produced at the new plant in a few days.

[16-10123]

DOROGOBUZH AMMONIUM NITRATE, WEAK NITRIC ACID UNITS POSTPONED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Sep 69 p 1

[Article by M. Ziborov: "They Fell Back in a Hurry"]

[Text] "Hardly worth it, writing about these projects. We've chalked them up a long time ago," said A. Volkov, head of the Main Industry Administration for Chemistry, USSR Ministry of Construction.

He is talking about this year's start-up projects--the second installations of ammonium nitrate and weak nitric acid at the Dorogobuzh Nitrogen Fertilizer Plant.

"We should now be making even ammonia faster. What has even gone uncommissioned even from last year," added A. Volkov.

Stal'konstruktsiya Trust Director M. Kolesnik had the same opinion. The job of his subdivisions, he believes, is to make operational as much equipment at the scheduled start-up complexes as possible; but the actual start-ups are really out of the question. Even if strenuous forced-paced work goes on in two or three shifts, the effort will come to a standstill because of the absence of equipment.

"And at least six months will be used up in installing and adjusting the equipment," Tsentrtekhnmontazh chief engineer Yu. Rivkin amplifies.

And, finally, the view of the director of the Dorogobuzhkhimstroy General Contracting Trust, M. Novoseletskiy:

"We have to add about 500 new people for our current annual program. It's the shortage of personnel that forced us to hold up the commissioning of the ammonia facility and that delay led to a further setback."

But this kind of arguing is dubious. That conclusion became clear after many talks with the directors of construction and installation organizations and industrial customer representatives. The real reason behind the setback in ammonia facility operations is the lax engineering preparations for the project. By regulations, all underground utilities must be made and the grounds must be prepared and cleared up before installation work steps up. But in this case everything went the other way. High-priced imported equipment was assembled in mud. Foundations were not gotten ready in time for the supports; because of this, serious difficulties cropped up in tying down the furnaces. A great deal needed to be redone.

I met with one of the best brigade leaders, V. Kudlov.

"We're working at full tilt. Foul-ups are coming up all the time. They gave us a crane to install structural members, but they never transferred a KrAZ truck to us. And another time it was the other way around: they delivered the structural members--but no crane. What resulted was that instead of ten days, we are installing the project in about a month."

Other facts bear out the conclusion that worker shortage alone cannot explain the setback in construction. Last year the actual labor force in Dorogobuzhkhimstroy per million rubles of construction and installation work was even higher than the planned valued. But the program was still not carried through. Why so? Because labor productivity went down 6.5 percent. So a way out has to be found not in bringing in more workers, but in raising their labor productivity. On top of this, the personnel shortage grew largely due to the fault of the trust supervisors. Personnel could be drawn and consolidated by giving them good living conditions. But Dorogobuzhkhimstroy's housing construction plan perennially falls through.

"We can't take on people for housing," argues comrade Novoseletskiy. "If we did, the schedule for the main construction would suffer."

The trust director pulled a fast one by claiming that they "can't take on people." To be more precise, they failed to try. On the contrary, workers from a construction administration set up specifically to put up apartment houses were transferred to erect the projects.

The trust itself cut back on tree boughs and on shipments of prefabricated reinforced concrete. About 15,000 cubic meters was required last year by the construction project and just half was shipped in. The plant making reinforced-concrete products was placed in service in a great state of incompleteness and that is why it has failed to reach the design capacity.

The ministry tried to justify its attitude to the Dorogobuzh start-up complexes like this: you see, the question about carrying over the start-up

date to next year has been settled in the USSR Gosplan. But the exact opposite was asserted by I. Barskiy, deputy head of the chemical industry in Gosplan: nobody has lifted their scheduled start-up projects from the Dorogobuzh builders. That makes sense--next year at the Dorogobuzh Plant a catalyst-making factory is to be placed in service, most important for the whole mineral fertilizer industry; one more year--a nitroammophoska facility. Then--a new facility making ammonia, carbamide, argon....

Clearly, we see that with such a tight program there will be a transfer of start-up schedules to the year to come. Chalking up current start-up projects is impermissible also for the reason that the internal reserves of the construction organizations are far from fully tapped.

[16-10123]

SECOND AMMOPHOS COMPLEX ON-STREAM AT VOSKRESENSK PLANT

Moscow STROITEL'NAYA GAZETA in Russian 15 Aug 79 p 1

[Article by V. Bebko: "Voskresensk Cooperation"]

[Text] On 11 Aug the second complex producing ammophos at the Voskresensk Minudobreniye Association went on stream in Voskresensk, thanks to subdivisions of the Ministry of Installation and Special Construction USSR and the Ministry of the Chemical Industry.

On the eve of this labor holiday two more joyous reports came to Voskresensk. To a large group of designers, builders and ammophos production equipment operators (first complex) was awarded a bonus of the USSR Council of Ministers for 1979. Among the laureates are the brigade leaders A. Knyazev and V. Bashkin, V. Kotov, trust head, and V. Zarubin, section head. Another group of workers was awarded orders and medals for the successes scored in constructing and bringing to operational level the capacities of sulfuric acid production.

Everyone involved in constructing the ammophos production complex had to overcome difficulties in good measure. In fact the operations had to be carried out while production was already going on. So a clear-cut interaction among builders, installers and designers took on special importance. They oriented themselves toward the maximum combination of all construction and installation work. To take an example: engaged at the same time in the main building were subdivisions of Stal'konstruktsiya and Trust No 7 of the Ministry of Installation and Special Construction and Trust No 5. The first-named group installed the building's skeleton, the second--its equipment, while the third did general construction work. Yu. Klimakov's brigade

coped masterfully with the installation of the special-purpose drying drums. Through its mastery and strenuous exertions, all the subcontractors were handed the work front on time.

Collaboration went off well between builders, installers, adjusters and equipment operators. The chemical workers built up experience in functioning during start-up adjustments and, thus, long before start-up they began readying for this goal--bring the design capacities up to operational level on shortened schedules. So the day the complex came on stream the ribbon did not have to be cut in front of the central control panel in Shop No 2; there was no need to track how the first production came off.

For the Moscow area builders the construction grounds in Voskresensk turned into a proving-grounds for advanced construction experience. Employed here were not just innovations in technology, but also effective forms of socialist competition: under the "Workers' Relay-Race" principle and under the motto "Work Without Lag-Behinds."

[16-10123]

THREE RUSTAVA CHEMICAL PLANT SHOPS AIM AT ADVANCE START-UPS

Tbilisi ZARYA VOSTOKA in Russian 18 Aug 79 p 2

[Article by N. Kvizhinadze: "Birth of a Giant"]

[Text] Reconstruction of the Rustava Chemical Plant is picking up speed. The prime target of builders and installers is to put three start-up projects into service ahead of schedule: the ammonia shop, the weak nitric acid shop and the ammonium nitrate shop.

We are driving along verdant plant avenues. Some minutes go by and ahead of us loom the new construction sites. "Like it?" Plant party committee secretary D. Rukhadze wipes sweat off his brow. "You haven't yet seen our sights--the ammonia shop. Here is where the real beauty is. Admittedly, austere, but genuine...." We pull up to the final destination--the headquarters for the reconstruction of the Rustava Chemical Plant, all the while Dzhoni Kalistratovich talks about this giant project with some pride.

The work front stretched over an area of 28.9 hectares. About 2000 builders and installers are actually putting up a new plant in a plant. This new plant will be made up of well-lit spacious production buildings with the most modern equipment and with innovative technology and intelligent and high-productivity automatic units. Enterprise capacities will nearly double.

Challenges that are awesome in scope confront the general contractor--Zakavkazmetallurgstroy Trust No 1 of the republic's Ministry of Construction and subcontracting organizations. Construction and installation work valued at 26 million rubles needs to be done; 116 kilometers of pipelines have to be laid; and 42 kilometers of power transmission lines have to be strung. Much has already been done today. Right now prime builders attention is riveted on the start-up projects. The target is high and hard to reach: by early November ammonium nitrate and nitric acid production facilities are to be placed on stream and by the first of December--the ammonia facility. But here people believe in victory, by stepping up the pace of operations day after day.

We stop at the ammonia production complex. Here equipment installation is going on at full steam; construction operations are winding up. Stage one of a shop with a 200,000 tons a year product capacity is being readied for start-up adjustments. We meet T. Kardanakhishvili, chief of the project under construction. He tells us:

"The most critical time has come for us. We have to manage within very tight schedules. Work has been organized in two shifts; in the most critical sections--in three. Installers are handling one-and-a-half to two norms a day."

Workers from the Nizhnekamsk Heat-Installation Administration are engaged in installing the main primary reforming equipment. This job is not a simple one--installing equipment designed to operate at pressure to 350 atmospheres and at temperatures to 1000 degrees. The Nizhnekamskites are not experimenting--reliability is guaranteed.

And next-door, in the building of the plant reconstruction headquarters, telephones ring without letup; department and service personnel scurry in corridors: schedules are being updated; the state of affairs in the projects of the construction site's coordinating center is under continuous analysis. Holding an operational conference in one of the rooms is the headquarters chief, the director of Zakavkazmetallurgstroy Trust No 1, K. Gogichaishvili. The conversation is laconic, about the essentials. Questions brought up are resolved in short order. Production subdivision directors enter the charges in their notebooks; there too they correct the day's program in strict accord with the task posed. They are envoys from different cities across the country--Kalininograd and Voronezh, Leningrad and Baku, Batumi and Tiraspol'; they arrived here to help the workers of the republic in constructing the biggest chemical enterprise of the Transcaucasus.

The plant tour winds up. Karl Vladimirovich willingly agrees to explain the situation in the construction grounds.

Something like 13 million rubles was to be spent this year in construction and assembly. More than half this amount was used up in seven months. Subcontractors take stock: the project was supplied with specialists at the same time while installation work here comes to more than 50 percent of the whole volume. In fact, even the industrial customer is not at his peak--process equipment was not supplied the construction project on time. The trust, too, has overlooked much. But the lag will be made good in the shortest time. What is most labor-intensive--readying the work front--is already in the past. July was when the state plan was met; in August it will be considerably overfulfilled.

"Thirty-three construction-installation organizations are working on plant reconstruction," continues K. Gogichaishvili, "three transportation organizations and two mechanization administrations. This is a large force and managing it is complicated. Foul-ups have happened. We try not to repeat mistakes. Even the subcontractors themselves soberly evaluate the state of affairs. Lately they have noticeably quickened their pace. Good demonstrations have come from personnel in the Rustava section of Promventilyatsiya, the Rustava administration of the Gruzelektromontazh Trust and other organizations. The collectives of the construction administrations No 3 and No 8 are stand-outs.

We set out to backtrack our steps. On the way we catch the attention of D. Rukhadze: is the enterprise ready to accept new shops? Here's what he answered:

"Right now to Severodonetsk and Cherkassy, where special teaching centers are functioning in our specialization, we've sent two groups of young workers. Soon they'll be coming back and will participate in start-up adjustments so that in the future they'll be heading the most responsible sections of the facilities brought on stream. Not long ago the party committee passed a resolution on organizing in the new shops primary party organizations, to be given over completely to personnel affairs. These and other actions enable us to bring up the introduced capacities to design level on the shortest schedules."

[16-10123]

CSO: 1841

ODESSA PORT AREA PLANT, SECOND STAGE, BEATS START-UP TIME

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Sep 79 p 1

[Article by A. Dzhioyev, correspondent, press center of the USSR Ministry of Installation and Special Construction: "Beating the Clock--Second Stage of Giant Plant Goes into Service"]

[Text] Late last year the builders, installers and equipment operators of the Odessa Port Area Plant wound up construction and placed on stream ahead of schedule ammonia facilities that have a capacity of 450,000 tons a year, along with mechanized complexes for loading chemical products. In congratulating the many-thousands-strong collective on its great laboring triumph, Leonid Il'ich Brezhnev, General Secretary of the CPSU CC and Chairman of the Presidium of the Supreme Soviet, then wrote what follows in a letter of greetings: "I express my firm certainty that you will staunchly battle in the future also for the advance commissioning of second-stage projects and for bringing the capacities of the Odessa Port Area Plant up to design levels. . . ."

. . . And here we are on the bank of the estuary where, several tens of kilometers from Odessa, the second stage of the giant plant went up in record time. This unprecedented chemical complex was erected by the Chernomorgid-rostroy, Odeskhimstroy and Chernomorpromsantekhmontazh trusts and many other construction and installation organizations. During several days before the start-up at the republic Komsomol shock-priority construction site socialist competition was gotten underway for the right to hand over, ahead of schedule, the symbolic key from the enterprise second stage to the equipment operators. Dozens of brigades labored with high spirits. But the best of all were the installers' collectives led by N. Kotoniy and I. Sherstyak. During the installing of the compressors they also completed some of the start-up adjustment work--they centered the piping and the pumping installations. As a result, they finished assembling the compressors four months faster than at the first ammonia facility.

The unitwise method of construction became one among the main factors behind the accelerated start-up of the high-tonnage installation on schedules as condensed as these schedules.

This method lent itself to broad possibilities in organizing rapid installation. To illustrate: the multiton roofs of the giant cylindrical stores of chemical products were assembled in advance at the bottom of tanks and then raised with water and compressed air. The operation took just half an hour.

"While we did eight percent of the total volume of installation work each month when we were putting up the first installation, this indicator was brought to 12 percent for the second installation," says D. Turbanov, head of the Odessa Specialized Administration No 532 of the Chernomorpromsantekhmontazh Trust.

Particular mention must be made of the fact that the builders not only shortened the schedules, but also thereby economized good amounts of material: cement--nearly 3000 tons, reinforcements--1400 tons; and the total economic benefit from the rationalizers' suggestions was more than 1.1 million rubles.

The second installation is going into service; a handful of days remained before the start-up of the mechanized complexes loading chemical products. Builders and installers have kept their word: they have brought the start-up of a most important national-economic project three and a half months closer.

[16-10123]

SOLIGORSK'S FOURTH POTASSIUM PLANT ADDS SECOND CHLORIDE LINE

Minsk SOVETSKAYA BELORUSSIYA in Russian 1 Sep 79 p 1

[Article by V. Prikhod'ko, BELTA correspondent: "Threshold to the Second Million: Transformations Wrought by Five-Year Plan"]

[Text] Installation of the equipment in the second process line making high-grade crystalline potassium chloride in a beneficiation plant was completed as part of the construction of the Fourth Potassium Plant in Soligorsk.

Crowded now are the trains heading to the Fourth Potassium Plant: it began the year with initial output and is quickly gaining strength. Miners and builders hurry to work in comfortable railroad cars. Both miners and builders have strenuous work schedules. The miners are competing for the right to start the records going on the second million ton of the "stone of fertility" since operations began. As for the builders, they are stepping up the pace of erecting the second stage of the giant plant: its start-up is projected for year's end. When it is brought up to operational capacity, the enterprise capacity will come to 3.5 million tons. This will enable Belorussian potassium industry workers to bring product output up to the volume provided for in the "Guidelines for the Growth of the USSR National Economy for 1976-1980."

In many ways the enterprise stands out over its predecessors. In it has been installed the most up-to-date domestic equipment. Here fertilizers are extracted, for the first time in the country, from ores by an innovative halurgic method. The product yielded by this method stands out for its high quality--the content of active principle in it was brought to the most stringent world standards.

In bringing the new production lines up to design capacity, the Soligorsk workers are stubbornly battling to boost product output at the operating mine administrations. They all are now in reconstruction.

"Since the first of the five-year plan period we have shipped users an extra million tons of 'fertility vitamins' beyond the plan," said G. M. Serenko, assistant to the general manager of the Beloruskaliy Association. "This amount could have been bigger. But the late delivery of rail cars for shipments is severely dragging down the buildup of production volumes. About 200,000 tons of fertilizers, impatiently awaited by farmers, has piled up in the warehouses."

[16-10123]

MODERNIZING ALMALYK CHEMICAL PLANT ADDS AMMOPHOS CAPACITY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Sep 79 p 1

[Article by Ye. Taubenshlag, TASS correspondent: "On Communists' Initiative"]

[Text] Without enlarging its production space the Almalyk Chemical Plant is adding to its capacity. A gain in product output equal to commissioning the additional fourth stage of the enterprise will come from reconstruction that has begun in the shops.

The reconstruction is thorough-going, though the plant is a newcomer: mineral fertilizer began to be produced here some ten years ago.

"Science, advanced experience during this time discovered new possibilities," said K. Sadykov, plant manager; "all we need to do is compare the first shops of our enterprise with the shops recently placed in service. Numerous installations, instruments and equipment with which the new shops are provided embody the thinking of plant rationalizers and inventors. In collaboration

with the scientists, it was possible to resolve the problem of first-rank importance: to set up the production of concentrated nitrogen-phosphorus fertilizers from the lean ores of the Karatauskoye deposit. Today nearly all Almalyk ammophos is of the highest grade; in it the phosphorus and the nitrogen are at content levels higher than assumed.

The deductions from it make a weighty contribution to the enterprise funds. And even the state is quick to direct funds for expansion and equipping of the plant: here each ruble of capital investment brings in a fast return.

Here are characteristic features of the plant's biography: all three stages were started up ahead of time; each of them was brought to the rated capacity ahead of schedule. This way additional hundreds of thousands of tons of valuable mineral fertilizers were realized.

Emphasized in a resolution of the CPSU CC and the USSR Council of Ministers, "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Higher Production Efficiency and Product Quality," was that modernizing existing enterprises is one of the paramount ways of achieving growth. It is precisely this way that was chosen by the collective on the initiative of the plant's communists.

The reconstruction plans were drawn up with reference to the advanced experience--of the enterprise proper and allied enterprises; also considered were the recommendations of scientific institutes and design offices. The schedule provides for replacing obsolescent equipment with new equipment--on the planned-repair days. Entire process lines are being modernized. Calculations confirmed the following: reconstruction will up ammonia output a third--this then is an increment tantamount to commissioning one more plant stage. But this effort will prove to be severalfold cheaper than constructing and installing new shops; and the return on the capital investment will occur somewhat sooner--as soon as 1980.

Will the collective of workers and engineers then manage with the swelling production volume? Yes--is what they believe at the enterprise. Labor productivity will climb not through outlays of physical labor: hundreds of chemical workers will learn to work with more advanced equipment. In just the last year every other worker advanced a work grade and mastered a related occupation.

[16-10123]

CSO: 1841

CHEMICAL PLANT AT VORONEZH

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Oct 79 p 1

[Article by M. Seredin: "The Plant Has Begun To Live"]

[Text] The workers in the fields of the Central Chernozem region have long awaited the operational start of this plant, which has sprawled out in the south of Voronezhskaya Oblast. Now the priority complex of the Don region chemical industry, which, after achieving the planned level, will produce 765,000 tons of ammonium nitrate and 380,000 tons of dilute nitric acid each year, has been put into operation.

The construction workers of the Voronezh Territorial Administration and the installation workers of the USSR Ministry of Installation and Special Construction Work have contributed a great deal of work to establishing the new capacity. A solid program of construction and installation work was fulfilled.

... The ammonium nitrate shop. Strictly speaking, the word shop is quite arbitrary in this case. As V. Druzhinin, chief of the shop, said, it includes nine wings standing in a row, each of which performs its own industrial processes. This whole complex production facility is controlled by an operator from a central control panel. The installation of the industrial equipment in this shop, just as in the others, was successfully performed by the Yugovostoktekhmontazh Trust. Large amounts of work at the Don Chemical Plant fell to the share of collectives of the specialized Yugovostokstal'konstruktsiya and Yugovostokelektromontazh trusts of the Voronezh Territorial Administration. Many of the competitors were famous for high labor accomplishments. For example, the brigade of communist labor of steeple-jack installation workers, headed by communist Ye. Karpeyev, organized its work on the basis of brigade contracting and introduced consolidated assembly of metal structures. Due to this, the periods for installing the large wing of the heat-recovery central heating and power plant was cut almost in half. Brigade members V. Shabalin and A. Vishnyakov, of the brigade of installation workers of V. Pozhidayev, the brigade of carpenter-concrete workers of S. Gurevich and many others worked on a shock work schedule. The close collaboration of the participants in the construction project based on the "workers' relay race" of associated workers contributed to the success.

The detachment of volunteer workers--envoys from the Voronezh enterprises--left fond memories at the construction project.

The new plant is beautiful. Its tall buildings, between which asphalt roads and sidewalks extend and the industrial pipelines, painted silver, delight the eye. All the necessary everyday conditions are being created for the workers at the plant. Two microrayons are being constructed at Rossoshi which include multi-story, well-appointed apartment houses, buildings for cultural-everyday purposes and trade enterprises.
[35-12151]

CHEMICAL PLANT AT RUSTAV

Tbilisi ZARYA VOSTICKA in Russian 28 Aug 79 p 1

[Article by V. Kremer: "A Construction Project of Particular Importance"]

[Text] The leader of Georgia's great chemistry--the Rustav Chemical Plant--is being rejuvenated. The enterprise is being renovated, its shops are being modernized, new, extremely improved equipment is being put into operation and the main thing, increasingly newer production facilities with great national economic importance are being put into operation. This year alone 26 million rubles should be expended for construction and installation work--considerably more than was spent for the construction of the first sections of the enterprise.

This year there should be put into operation complexes of shops for ammonia production with a yearly capacity of 200,000 tons, for dilute nitric acid--372,000 tons, and for ammonium nitrate--450,000 tons a year. This is almost twice as much as has been produced up to now. The construction and installation workers have given their word to complete all the jobs at a high level and this year to put them into operation ahead of schedule.

The whole country is helping to erect the facilities for the great chemistry industry in Rustav. The equipment is received from Moscow, Kaliningrad, Volgograd, Khabarovsk, Tula, Cherepovets and many other cities. Up to 2,000 persons are employed today at the construction projects underway. Here too are many envoys from our republic and the fraternal republics of the country. The staff set up for the construction and the party groups are sustaining a high degree of enthusiasm and working mood in the masses and are performing purposeful work to eliminate lagging behind at certain sections.

Comrades E. A. Shevardnadze, P. G. Gilashvili, G. V. Koibin, Z. A. Pataridze and Z. A. Chkheidze visited the construction site of the underway projects at the Rustav Chemical Plant on 27 August. Along with them were Yu. I. Kedishvili, deputy chairman of the Georgian SSR Council of Ministers, V. I. Karumidze, chief of the Division of Propaganda and Agitation of the Georgian Communist Party Central Committee, V. Z. Barsukov, head of the Industrial-Transport Division of the Georgian Communist Party Central Committee and R. A. Dzhaparidze, chairman of the Georgian SSR State Committee.

They examined the shops, columns, cooling towers, scaffolds and other complex engineering-technical structures of the underway complex and the workers' dining halls, trade complex, sports campus and cultural-everyday facilities for the Rustav chemists that are under construction.

The explanations were given by K. V. Gogichayshvili, director of Trust No 1 of the Georgian SSR Ministry of Construction, A. A. Avetisov, chief of the Gruzmontazhspetsstroy Administration, and G. T. Gogoladze, director of the chemical plant, who are supervising the city's party and Soviet workers.

At a conference held at the plant it was noted that in the last few months a great deal of work had been done at the construction project to overcome the lagging behind. The plans are as a rule being fulfilled. The technical-economic indicators have improved. This progress has been achieved as the result of the great amount of purposeful organizational and party-political work, a considerable improvement in the management of the economic affairs and widescale development of socialist competition.

The participants in the conference also pointed out individual shortcomings. They have to do mainly with the behind-schedule supply of equipment, individual grades of pipes, refractory materials, construction timber and pre-cast reinforced concrete. In connection with putting new production capacities into operation there must be an intensification of attention paid to problems of training skilled personnel for the plant, creating all the conditions for improving the material well-being of the workers and putting into effect all the items of the plan for social development of the enterprise's collective.

The press, radio and television should daily monitor the course of the construction and installation work, bring into the spotlight the heroic work-days of the construction, installation and operations workers, organize social stations at the projects under construction and regularly inform the readers and listeners on the state of affairs.

The results of the conference were summed up by Comrade E. A. Shevardnadze, candidate-member of the CPSU Central Committee Politburo and first secretary of the Georgian Communist Party Central Committee.

[35-12151]

CSO: 1841

PAINT PLANT AT YAROSLAVL'

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Oct 79 p 2

[Article by V. Kremer: "A Department That Looks Ahead"]

[Text] In the decree of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism, including measures for a further increase in social production efficiency, a prominent place is allotted to modernizing and technical reequipping of existing enterprises. Worthy of attention in this connection is the experience of the Yaroslavl Lakokraska Association of the Ministry of the Chemical Industry, where an engineering department for long-range development has been established, and is operating successfully.

Rita Semenova, a laboratory worker in the epoxy resin shop, poured a small handful of reddish brown powder into the palm of my hand.

"Is this a component of your new product?" I ask.

"Your are wrong, it is paint ready for use! I can show you how it is done."

She fastened a small plate in the testing chamber, pointed a paint spray gun at it and pressed the trigger. The chamber was immediately filled with a reddish cloud....

Then I discerned a metal rectangle, still warm from the drying apparatus, covered on one side with an even coat of paint. No matter how hard I looked, not the slightest crack, not the least pinch of powder was perceptible on the shiny, glasslike surface. Just to be certain, I scratched it with my fingernail--no effect.

"Have no doubts," smiled Rita. "We guarantee the quality!"

Putting into production the first industrial process in the country for obtaining powdered epoxy paints is one of the most recent pieces of work of the department for long-range development of the Yaroslavl' Lakokraska Production Association. It all began this way....

The system in principle for obtaining a powder able to compete with the long customary liquid paint was worked out at the head institute of the paint and varnish industry. The scientists suggested that the Yaroslavl' workers test the new process. An experimental test unit thus appeared in Shop No 7.

It had scarcely issued the first tons of the product when the consumers jumped at it. It would be surprising not to jump at it! The process of applying powdered paint using the method of spraying in an electric field is relatively simple, and lends itself easily to automation. The coating meets the most rigid requirements. Moreover, ordinary paint is half solvents--essentially ballast. Here, however, you have nothing superfluous, a 100-percent pure paint substance! The economic effect from using each ton of powders is about 3,000 rubles.

In general, it rapidly became clear to everyone: mass production must be set up. How should events develop now?

The traditional pattern is well known. First the technical-economic assignment to construct the industrial unit is drawn up. Then the planning documentation is worked out, orders are distributed for the equipment, a construction contracting organization is found.... In a word, a cumbersome and, alas, often even wheel-spinning mechanism must be put into operation, called upon to ensure the advance of the innovation from sample to series.

The Yaroslavl' chemists did not take this route.

"Leave us the test unit," they said, "and we ourselves will turn it into a large-tonnage unit."

"But how about the designing, the nonstandard equipment? It is still no joke--the first such production facility in the USSR!"

"Our long-range development department will take care of all that...."

Without going into the technical details, we will tell about the result. In accordance with the most careful estimates, the renovation cost half as much and was carried out twice as quickly as new construction. A seven-story steel machine arose at the site chosen for the living thread of the experimental unit. The output of powdered paint of five grades was mastered. The principal buyers of the powders were the Volkhov Aluminum Plant and enterprises of the pipe and electrical equipment industry.

"By the end of the five-year plan we estimate increasing the powder output 1.5-fold at minimum," says Pavel Iosifovich Kestel'man, chief technologist of the association, when showing me the new production facility. "Even today we could yield considerably more, if there were no trouble with the raw material...."

Here, perhaps, is the very place to explain what, strictly speaking, the long-range service is. Gennadiy Grigor'yevich Bobrov, director of the association, began from way back:

"The logic of scientific-technical progress is such that an enterprise, even one that is doing outstanding work, cannot stay in place and put out the same products for years. Particularly in such a dynamic sector as chemistry. New types of raw materials appear, improved production processes are designed, the demands of the numerous consumers change.... Here, then, the objective need for constant updating comes into conflict with the fully natural attempt of people to retain what has already been set up and tested, what makes it possible to fulfill the plan without special expenditures of nervous energy.

"Where, then, is the way out?" Bobrov paused. "Specialists in the theory of administration in such cases say: each one must carry his own suitcase. This is the principle that we have taken as the basis in establishing the department for long-range development. Only those who work directly for the plan have been left in the shops. As fine a line as possible has been drawn between those who should ensure the efficient administration of the production and those to whom it has been proposed to look ahead, to think of its further development. The latter were chosen under the guidance of the chief engineer. Incidentally, in accordance with the official instructions, at our enterprise he is freed from solving regular daily problems. For this we have a deputy director of production."

Today almost half of the association's engineering corps is employed in the long-range department. It includes a central plant laboratory provided with the newest equipment (any institute can envy it!), and the sections of the chief technologist, planning-design and standardization. The work is carried out in accordance with a five-year plan. The main directions are improving the existing industrial processes, developing new grades of products and advanced technology, and comprehensive mechanization and automation of labor-intensive operations.

These figures will make it possible to judge the scale. In 3 1/2 years, 8 mechanized flow lines and the same number of advanced industrial processes have been put into operation, and 16 new grades of products have been developed. Over 400 major measures have been recorded in the five-year plan for technical development. The yearly economic effect from the ones that have already been put into operation was 8.4 million rubles.

Here it must be noted that the Yaroslavl' association is not among those modern giants of industry to which a substantial share of its own variegated products is supplied. It was formed as the result of the merging of two small paint and varnish plants, the history of which began as far back as the last century. Nevertheless, the level of labor mechanization here is the highest in the subsector. In the last three years the production volume has increased by almost 30 million rubles, with all the increase provided through the modernization and technical reequipment.

"I don't want you to form a false impression," continued Gennadiy Grigor'yevich. "A sheer creative "holiday," as they say, is one thing, and a perpetual race for the plan is another. To make a clearcut dividing line by no means signifies a blind wall. On the contrary, the long-range department is developing and introducing its innovations with the active participation of other subdivisions and services and shop workers. Otherwise, it simply could not be: our collective is one and the tasks are unified."

The plant researchers are not particularly worried about considerations of priority, and have nothing against "outside" technical ideas. Nor is it so terrible if the idea turns out to be, as they say, unripe. The long-range department will manage to "make sense of it," and to adapt it to the actual conditions of its production. In a word, it will perform the work that is outwardly not very striking, but completely necessary, which the substantial scientific research organizations are not very willing to take up. In all fairness it is worth mentioning that the workers in the department do not only develop outside ideas. Among their active members there are original inventions protected by authorial certificates. They told me, for example, about the primer with increased reliability, created at the request of Kam AZ, which was awarded the State Seal of Quality. Today they are coating the motors of powerful machines with it at Naberezhnyye Chelny.

Gennadiy Samuilovich Ioffe, the association's chief engineer, remarked to me in a conversation, it seemed to me with some resentment, that at the technical council of the head institute the developments pass through more easily than at their own.

"Do they have less confidence in yours?" I asked.

"No, no, that's not it at all, you misunderstood me.... For outside jobs, like it or not, a certain allowance has to be made for the fact that they cannot take into consideration the plant reality in all its complexity. We do not have to rely on such allowances: the new process should be completely ready for industrial use."

Well then, here, obviously, lies the main strength and main advantage of the plant's long-range department. By ensuring a continuous process of production updating, it has become a reliable and effective instrument for accelerating the rates of technical progress at the enterprise.

In its nine years of existence, the engineering department for long-range development has fully proven its right to life. Its establishment requires neither an increase in staff or any other additional expenditures. It would seem that in the light of today's requirements for increased production efficiency, the experience of the Yaroslavl' chemists deserves support and dissemination.

[35-12151]

CSO: 1841

TITANIUM DIOXIDE PRODUCTION CRITICISM ANSWERED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Oct 79 p 2

[Article by Ye. Vlaskin, deputy minister of the Chemical Industry]

[Text] In the article, "Debates at the Departmental Level," published in the newspaper SOTSIALISTICHESKAYA INDUSTRIYA on 17 May of this year, the question is correctly raised of the unsatisfactory state of affairs with respect to the development of a domestic production process for titanium dioxide using the chlorine method.

To solve the problems of planning, constructing and putting into operation a complex for the production of titanium concentrate, the Ministry of the Chemical Industry has drawn in the organizations under its jurisdiction.

An experimental unit for pigmentary titanium dioxide is now being set up at the Yaregskoye deposit.

The Ministry of the Chemical Industry feels that it is necessary for the Ministry of the Petroleum Industry to complete, in the near future, construction of the facilities for the experimental-industrial complex for the production of titanium concentrate, including setting up a unit for obtaining autoclave concentrate.

The problems raised in the article concerning completing the construction of an ore-dressing complex and turning it over to the Ministry of the Chemical Industry should be solved in USSR Gosplan, also enlisting the USSR State Committee on Science and Technology.

On its part, the Ministry of the Chemical Industry will take the necessary measures to solve this problem.

[35-12151]

12151

CSO: 1841

USSR

KIEV PLANT PRODUCES MARINE PAINT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 25 Nov 79 p 2

[Article by Zh. Tkachenko: "Effective Protection"]

[Text] The Kiev Paint and Lacquer Plant has started to produce polyurethane enamel. It provides dependable protection from corrosion to ship structures, as well as various containers used in the food industry. The first shipment of the new production is consigned for ships in the Azov Sea.

[65-P]

USSR

REGENERATOR-REGULATOR DELIVERED TO NITROGEN FERTILIZER PLANT

Moscow SEL'SKAYA ZHIZN' in Russian 11 Nov 79 p 1

[Article: "For the Fertilizer Plants"]

[Text] Dzerzhinsk. (Gor'kovskaya Oblast). The local chemical machine building plant has delivered a complex regenerator-regulator ahead of schedule to the Tol'yatti Nitrogen-Fertilizer Plant imeni 50th Anniversary of the USSR. The production of this unit has been mastered for the first time by an enterprise in our country.

The Chemical Machine Building Plant delivers production to the Ukraine, the Urals, Central Asia, Siberia, the Far East, and the Baltic. A significant part of the production of the enterprise is intended for chemical plants, especially for the production of mineral fertilizers. Since the beginning of this year, equipment worth about 19 million rubles has been delivered.

Month after month both labor productivity and quality of production are growing.

[62-P]

USSR

PROCEDURAL QUESTIONS RELATING TO FORECASTING THE DEVELOPMENT OF THE
CHEMICAL AND PETROCHEMICAL INDUSTRY AND THE BUILDING MATERIALS INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D.I. MENDELEYEVA
in Russian Vol 24 No 4, 1979 pp 388-389

BRAGINSKIY, O. B., Candidate in Economic Sciences, and ZABELESHINSKIY, Yu.
A. Candidate in Economic Sciences

[Abstract] A summary is given of the proceedings of the "Procedural Questions Relating to Forecasting the Development of the Chemical and Petrochemical Industry and Building Materials Industry" conference which convened in October 1978 in Kaunas in the Lithuanian SSR. Subjects of discussion at this conference were the further development of research on forecasting, the generalization of know-how gained in studies on making economic and scientific and technical forecasts, the coordination of research done, and the unification of procedural approaches to the development of forecasts. Taking part in the conference were 100 people. It was organized by the central and Lithuanian republic administrations of the All-Union Chemical Society imeni V. I. Mendeleyev, and by the ministries of the chemical, oil refining and petrochemical industry and the building materials industry, in conjunction with the Scientific Research Institute of Technical and Economic Research and the Kaunas Synthetic Fiber Plant imeni the 50th Anniversary of the October Revolution. The speakers and the topics of their reports are listed. Reports were given on such topics as the methodology of longterm planning and forecasting of the development of a branch of industry, the use of economic statistical models in medium-term forecasting of key indicators for the development of the chemical industry, the forecasting of capital investment in a sub-branch of the chemical industry, forecasting the demand for mineral fertilizers, forecasting the production and utilization of heat insulating materials, and methods used to forecast the development of chemical science and the industry abroad. The conference revealed that subdivisions involved in questions of forecasting have been created in many organizations. These subdivisions are developing procedural approaches to forecasting, making summary forecasts and forecasts for the demand for products, capital investment, and of labor productivity, and are employing various forecasting methods. The results of forecasting research are being transmitted to planning agencies. Deficiencies in forecasting research were also noted, including the lack of unified procedural specifications for forecasts and the low-level development of the forecasting system in automated control systems at different levels of control. Skilled personnel are scarce. Recommendations were made, aimed at increasing the role of pre-plan forecasts and at strengthening the scientific basis for their development. It was recommended that courses on forecasting be included in academic programs.

[39]

ENSURING SAFETY IN THE PRODUCTION OF CHLORINE AND CAUSTIC SODA IN LARGE PLANTS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 327-337

SIMON, A. G., and TIMOFEYEV, A. F.

[Abstract] A history is given of the development of various modern methods used throughout the world for separating a water solution of sodium chloride into chlorine and NaOH . In recent years electrolyzers with a solid cathode and an ion exchange membrane have been used employing the process of membrane electrolysis. This method makes it possible to obtain caustic soda of a high degree of purity. The use of fluorocarbon membranes such as "Nafion" is discussed. An 80-cell membrane electrolyzer developed by the Japanese Asahi Chemical firm is discussed. Ruthenium oxide anodes have begun to replace poor-wearing graphite, both in diaphragm-type and mercury-type electrolyzers. A description is given of the "Glanor" bipolar diaphragm-type electrolyzer with ruthenium oxide anodes, designed for large-scale chlorine production processes. In terms of safety, a major problem in the production of chlorine and caustic soda is the removal of mercury from hydrogen and caustic soda. In spite of some low figures cited for the release of mercury in chlorine production processes, it is felt that the mercury method ought to be replaced by safer methods of producing chlorine and caustic soda. Aspects of safety to be considered in designing new and reconstructing old chlorine plants include taking into account the physicochemical properties of the products of electrolysis, such as the high toxicity of chlorine, the explosion hazard of mixtures of hydrogen and chlorine and hydrogen and air, and the irritating and burning effect of the alkali on the mucous membranes and skin. Dangers in using the process of electrolysis with a mercury cathode include mercury poisoning and the possible electrocution of operating personnel. Since electrolyzers have been increased in unit power, there is the added danger of the increased magnetic field, which necessitates taking measures to protect from magnetic fields the operating personnel and the technological process for the electrolysis of sodium chloride. The main measures for ensuring safety in production with large plants are the following: the total mechanization of production, supplying electrolysis sections with subterranean brine instead of imported solid salt, introducing air cooling, and changes in the method of processing chlorine. Crucial measures to be taken are the automation and remote control of technological processes and the employment of systems for warning and interlocking process equipment with current converters. It is emphasized that the increase in size of plants has been conducive to improving safety because of the reduction in the required number of units. At the brine preparation stage safety is best ensured by the underground cleaning of the brine

from impurities harmful to the production process, such as salts of calcium and magnesium and suspended matter which is insoluble in water. This is done directly in cells for leaching the salt with water. Companies such as Dow Chemical perform this process in leaching wells. The impact had by the design of buildings on the safety of plants is discussed. Safety aspects of the transportation of chlorine in large quantities are discussed, as well as of storing it. Data are given on practices of firms around the world. Data are presented on the effects of chlorine on the human body and a table is shown illustrating the sensitivity of a human being to chlorine as a function of the length of his stay in a contaminated environment. The danger of liquid chlorine leaking from tanks in storage and transportation is discussed, as well as in the transportation of gaseous and liquid chlorine through pipelines. Emphasis is placed on the danger of the release of hydrogen in the production of chlorine. The control of pressure ratios in the diaphragm electrolysis method is discussed. A sketch is shown of a hydraulic gate unit for protecting from sudden fluctuations in pressure in the anode space of electrolyzers, chlorine collectors and equipment for cooling and drying chlorine. A sketch shows a unit for cleaning chlorine from absorbed gases. The corrosive effect of wet chlorine is discussed in terms of resistant materials suitable for the fabrication of equipment and pipelines, such as a glass fiber reinforced polyester resin with a high chlorine content, such as "Metron-197" resin. Specifications for coolers for chlorine in production processes are discussed. A sketch is shown of a combined drying column for chlorine. Questions of electrical safety are detailed. Figures 6; references 79: 39 Russian, 40 Western.

[39]

CSO: 1841

QUESTIONS RELATING TO SAFETY PROVISIONS IN POWER AND PROCESS PLANTS FOR THE PRODUCTION OF NITRIC ACID

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 320-326

ZAICHKO, N. D., Candidate in Technical Sciences and Director, GIAP [State Scientific Research and Design Institute of the Nitrogen Industry and Products of Organic Synthesis], and CHERNOMORDIK, L. I., Candidate in Technical Sciences and Chief, GIAP Combined Scientific Research and Planning Division of Chemical Power Technology and Industrial Heat and Power Engineering

[Abstract] At the present time more than half of the dilute nitric acid in the USSR is produced with plants with a capacity of 355 tons/day and operating at a pressure of 7.3 atm. This plant is called the UKL-7 and has been in existence since the middle of the 60's. In the middle of the 70's the AK-72 plants were introduced. The UKL-7 was created by GIAP with the specific purpose of practically totally removing oxides of nitrogen from exhaust gases. The design of the UKL-7 is distinguished by the fact that the chemical processing equipment is placed in series between the compressor group and the gas turbine unit (GTU). The unit's chemical technology is traditional in that it begins with the preparation and mixing of ammonia with air, and is unique in that it ends in a high-temperature unit for removal of oxides of nitrogen from exhaust gases. The initial combustion chamber for the GTU is located in a bypass section of the chemical processing equipment between the compressor group and the gas turbine. This combustion chamber is the chief source or one of the sources of heat for the GTU in the unit's starting and changing modes. The GTU is started by an asynchronous motor-generator with a phased-wound rotor. This new design required a new approach to problems of protecting the unit from damage to equipment and to other kinds of safety problems. The safety features incorporated in the UKL-7 and AK-72 are described in detail. For the purpose of explosion proofing the area containing the plant, the natural gas collector was extended along the outside wall of the engine room and warning devices were installed to warn of a dangerous concentration of combustible matter in the air. When the concentration reaches about 20 percent of the minimum explosion hazard limit, emergency ventilation is turned on and the GTU is stopped automatically. This has not been necessary in 10 years of operation. The natural gas is branched off from the common collector by a system of three valves, one of which is connected to the atmosphere via a blow-off pipe and is located between a prestop and stop valve. When the stop and prestop valves are closed the blow-off pipe valve is open, connecting the pipeline between the stop and prestop valves with the atmosphere; interlocking protection is thereby provided. This prevents the penetration

of natural gas from the collector into the equipment when the plant or GTU are turned off. The gas turbine unit of the 7.3 atm plant consists of a compressor group, a starting combustion changer, a gas turbine, a reducer, a motor-generator and an isolated system for controlling them and is technologically independent of the production of nitric acid. The AK-72 with a capacity of 1150 tons/day employs a similar principle. The gas turbine unit is started and stopped independently of the state of chemical production process parameters. The GTU can operate with damage to or during the inspection of equipment of the conversion and absorption sections. This speeds up the inspection of equipment in start-up and adjusting operations or when inspecting the condition of chemical process equipment. With an emergency in the chemical processing sections the interlocking safety system shuts off the supply of ammonia to the mixer, of water for irrigating the absorption column and of natural gas in the catalytic cleaning unit, and switches the gas turbine unit's operation to the power mode. The equipment of the conversion, absorption and catalytic cleaning sections then not only remains under operating pressure, but is ventilated by a steady stream of air passing through it. The safety of equipment and the GTU's machinery must be ensured when the plant changes over from the operating to the power mode. Also discussed are problems overcome in ensuring safety features for the nitrous oxide compressor and in automatically monitoring the flame jet. The conditions are listed under which interlocking devices are actuated in the GTU, and in which the motor-generator is shut off in the 7.3 atm unit in an emergency. For the purpose of improving the plant's operating safety, all the key operations for controlling the plant have been automated. The ratio of ammonia to air in front of the mixer and the ratio of fuel to air prior to the combustion chamber are automatically regulated in the 7.3 atm unit. References 22: 22 Russian.

[39]

CSO: 1841

LARGE PLANTS OF THE CHEMICAL INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 315-319

UPADYSHEV, K. L., Chief Technologist, GIAP [State Scientific Research and Design Institute of the Nitrogen Industry and Products of Organic Synthesis]

[Abstract] With the increase in capacity of chemical plant units there has been an increase both in savings and in the requirements for the reliability and safety of units. There are now plant units which have the capacity to produce as many as 1500 tons/day of ammonia, 1200 of ammonium nitrate, 900 of nitric acid, 1700 of carbamide, 1800 of methanol and 245 of caprolactam. Various aspects of the design of modern chemical plant units are discussed, with emphasis on the reasons for and prevention of large-scale accidents and pollution of the environment. The high reliability and safety of these units are especially necessary inasmuch as they are not provided with backup systems for the key equipment, resulting in prolonged shutdowns for repairs. Examples are given of design defects which have resulted in equipment lost time and blunders adversely affecting safety and reliability. In the selection of raw material and finished products, all the characteristics of the impurities present and their role in the technological process are not always studied. The failure to take chlorine into account in raw hydrocarbons has resulted in corrosion of the reactor tubes of a steam reforming furnace and other equipment and in the contamination of certain catalysts and the final product. Air contaminated with chlorine has been used as raw material for the production of ammonia. New designs of equipment are being incorporated in large plant units for the purpose of both making the equipment safer and of making it small enough for transportation by rail. New equipment designs should provide even distribution of flow, intensive heat and mass transfer, low hydraulic resistance, the absence of "dead" spots in which substances can accumulate which are dangerously explosive or have a tendency toward spontaneous combustion, good seals for the purpose of preventing the undesirable mixing of agents, durability of construction materials, and repairability. In the selection of materials for equipment, special attention must be paid to the possibility of corrosion cracking of steel types in such media as ammonia. Further study is necessary in this area. Presently 0.2 percent by weight of water is added as an inhibitor. Specifications for automatic controls and interlocking devices are discussed. These include independent but parallel-operation control and safety interlock systems, the provision of redundant sensing elements for the purpose of eliminating unnecessary shutdowns of equipment in the case of a malfunction in the safety controls, and the

successive tripping of safety interlocking devices for stopping hazardous production processes in multistage processes. Measures for ensuring the proper operation of automatic control and monitoring systems are discussed. In the oil refining industry pipelines are heated by using current-conducting bands of glass cloth containing a wire. This method might be used for electrical lines. Accidents have occurred because of the failure to provide independent electric power for serving different stages of a single complex process. The need for standby power sources based on generators driven by internal combustion engines or steam turbines, or employing storage batteries, is stressed. Gas exhausts must be analyzed thoroughly for pollutants, both from the standpoint of environmental protection and contamination of chemical processes. The quality of water used must also be monitored carefully. A careful study must be made of the possibility of and conditions for the appearance of biochemical reactions in mixing equipment; the products of these reactions can be hazardous for subsequent stages of the technological process, e.g., oxides of nitrogen for low-temperature separation of gases. For the purpose of reducing the danger of explosion, all equipment except that which must be placed inside should be installed in open areas. A list is given of reasons for accidents in equipment for unforeseen reasons, in spite of the fact that it was installed outside. The major cause was failure of bearings, packing glands, and gaskets (30.2 percent). The majority of accidents (about 75 percent) evolved over a period of time sufficient for the prevention of explosion. The majority of explosions could be prevented with the existence of automatic signaling devices for dangerously explosive gases in the air. The dimensions of areas designated as having a high explosion risk must be refined to take into account the range of the spread of the exhaust gas or steam. The need for automatic warning systems is stressed. References 8: 6 Russian, 2 Western.

[39]

CSO: 1841

UDC 66:331.876.4

SOCIALISTIC COMPETITION AT ENTERPRISES AND ORGANIZATIONS OF THE CHEMICAL
INDUSTRY IN LIGHT OF PROBLEMS OF THE CURRENT FIVE-YEAR PLAN

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, 1979 signed to
press 11 Sep 79 pp 515-521

CHEREDNICHENKO, K. K.

[Abstract] The state of affairs in the chemical industry was examined and the role of socialistic competition in fulfillment of the tasks set before the sector were described. Examples of formalism in organization of competition were discussed with conclusions about further use of forms and methods of competition to present this. Successes of some enterprises where competition actively serves fulfillment of tasks were presented. It was noted that well organized competition facilitates fulfillment of both technical-economic indicators and social problems, the solution of which helps to increase worker productivity.

[27-2791]

UDC 66.331.876.4

PRACTICE AND PROBLEMS IN ORGANIZATION OF SOCIALIST COMPETITION IN THE
10TH FIVE-YEAR PLAN

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, 1979 pp 521-536
signed to press 11 Sep 79

GOL'DIN, L. I., DRACHEV, B. V. and CHEREDNIK, A. G.

[Abstract] Speeches presented by participants in the competition in the city of Kazan, convening in July 1979, were reviewed. These addresses considered the present state of organizational work in the area of development of socialist competition in the chemical industry, analyzed existing shortcomings and presented recommendations of the conference for the removal of these deficiencies and for the elimination of formalism in the organization of competition. Lengthy excerpts from some speeches were presented.

[27-2791]

WARMING UP REACTORS OF SYNTHESIS OF ORGANOCHLOROSILANES IN A FLUIDIZED
BED

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, 1979 pp 563-564
signed to press 11 Sep 79

KUZ'MIN, N. G., BOGATYREV, V. N. and STOGAR, V. A.

[Abstract] Different methods of warming up reactors of synthesis of organosilanes in a fluidized bed of silico-copper melt by use as a heat carrier of hot nitrogen and water vapor were examined. An equation for calculation of the time of warm-up with consideration of the mass of silicon copper melt, the mass of the reactor itself and the heat loss in the environment was presented for each method of warm-up. The recommended method of warm-up permits reduction of its time and improves the work conditions in the operation. Figure 1.

[27-2791]

ELECTROCHEMICAL PROCESSES IN CELLS CONTAINING THIN MONOPOLAR ELECTRODES

Moscow ELECTROKIMIYA in Russian No 9, Sep 79 pp 1324-1328 manuscript received 20 Oct 78

KOSHEL', N. D., Dnepropetrovskiy Chemical-Technological Institute imeni F. E. Dzerzhinskogo

[Abstract] The distribution of processes for the title electrodes was considered when the electrodes were immersed in an electrolyte containing both reactive compounds and the gaseous reaction products. Equations were developed for three cases: 1, the leads were connected to one side of the electrode; 2, double-sided leads were used; 3, leads were connected to the opposite side of the electrodes. Configurations 1 and 2 result in individual cells; only 3 results in a multi-element cell. The analytical solutions to the current flow equations indicated that reactions were localized in the areas of the leads. For electrodes having an infinite width, the sum current I for the first two cases approached a constant value: $I_{\max}^{II} = 2I_{\max}^I$. For case 3, the maximum current I occurred for an average width of about 1.5 and then decreased asymptotically for further increases in the width. The maximum current was not obtained due to the lack of proper alignment of the leads. Aligned leads are unsuitable for multielement cells. References 6: 5 Russian, 1 Western

[03]

USSR

UDC 631.81

EFFECT OF LONGTIME APPLICATION OF MINERAL AND ORGANIC FERTILIZERS ON THE ORGANIC MATTER OF THE SOIL

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 8, 1979 pp 27-30

KHLYSTOVSKIY, A. D., VEKHOV, P. A. and the late BOGDANOV, N. M., Scientific Research Institute of Fertilizers and Insectofungicides imeni Professor Ya. V. Samoylov

[Abstract] The effect of the longtime application of mineral fertilizers and manure on the organic matter in dern-podzolic soil was investigated in the course of five multi-annual (1932-1977, 1938-1977, and other) experiments with various crop rotation systems (CRS) at the Dolgoprudnaya Agrochemical Experimental Station of the Samoylov Institute of Fertilizers and Insectofungicides. The topsoil (0-20 cm) samples collected were tested for content of carbon, nitrogen, and humus, compared with their original levels. It is concluded that moderate doses of mineral fertilizers in CRS without grasses or with annual grasses do not substantially affect the organic matter content of dern-podzolic soil. High fertilizer doses cause the topsoil to have a higher carbon and nitrogen content compared with nonfertilized control topsoil. But even extremely high doses of fertilizers cannot prevent the original carbon and nitrogen content of the topsoil from diminishing. Manure applied in the dose of 9 tons per hectare in CRS based on clean fallows does not assure a stable level of organic matter in the soil, but in the CRS including annual grasses it does assure such a level. An increase in the organic matter of the soil was observed only upon longtime annual application of 6-9 tons of manure per hectare in CRS employing two-year grasses and against a background of liming.

[49-1386]

USSR

UDC 661.3.001.5+66.084+542.92

TECHNOLOGICAL DEVELOPMENTS IN THE PROCESSING OF KARATAU PHOSPHORITES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 4, 1979 pp 53-56

YUNOSOV, D. Kh., TADZHIYEV, T. Kh., GORBENKO, A. N., ARIFDZHANOV, S. Z., and SAIPOV, A. E., Institute of Chemistry, Academy of Sciences Uzbek SSR

[Abstract] A brief review is presented of current trends and advancements in the technology of Karatau phosphorite processing. Of current interest are an effective and economical method of electrosublimation, 2.5-3 fold facilitation of nitric acid mediated decomposition by ultrasound cavitation, and treatment of ordinary and double superphosphate with gaseous ammonia or ammonia compounds. Tables 1.

[57-12172]

USSR

UDC 661.632.232

SINGLE STAGE NEUTRALIZATION AND DRYING OF ACID DOUBLE SUPERPHOSPHATE IN A FLUIDIZED BED SYSTEM

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 4, 1979 pp 44-48

ADYLOVA, M. R., USMANOV, I. I., and PAVLOVA, A. I., Institute of Chemistry, Academy of Sciences Uzbek SSR

[Abstract] Experimental conditions are described for the neutralization and drying of acid double superphosphate obtained from Karatau phosphorites by means of a KS apparatus using an ammonia-air mixture at 120-140°C to create a 100-110°C fluidized bed. Increasing the ammonia supply above stoichiometric levels leads to a marked decrease in water-soluble forms of phosphorus, while assimilable forms of phosphorus remain in the 95-98% range. The hygroscopic properties of ammoniated double superphosphates depend on granular size and duration of neutralization and drying. Tables 3; References: 2 Russian.

[57-12172]

SAFETY OF LARGE PLANTS FOR THE PRODUCTION OF AMMONIA

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 353-359

KHARLAMOV, V. V., Candidate in Technical Sciences and Chief Engineer of GIAP [State Scientific Research and Design Institute of the Nitrogen Industry and Products of Organic Syntheses], SEMENOV, V. P., Candidate in Technical Sciences and Director of the GIAP Scientific Research Division of Production of Process Gases, and KISELEV, G. F., Candidate in Technical Sciences and GIAP Chief Mechanical Engineer and Chief of the Scientific Research Division

[Abstract] Modern plants for the production of ammonia carry out many interrelated processes, including the mechanical and catalytic cleaning of gas and fluid flows, the compression of gases and fluids, heat and mass exchange under conditions of high temperature and pressure, various catalytic decomposition and synthesis reactions, and the burning of gaseous, liquid and solid fuel. A system this complex can operate efficiently only automatically with the total or partial control of a computer. Operating personnel have to work with toxic combustible and dangerously explosive substances under a pressure of as much as 320 atm over a wide temperature range from -70 to +1400°C. The key reasons for many accidents are violations of production process discipline, insufficiently high reliability in the operation of machinery and equipment, as well as in the operation of monitoring and automatic devices, the unsatisfactory organization of maintenance work and the use of faulty equipment, and poor knowledge regarding ways of ensuring safety. In the production of ammonia there is the steady exhausting of smoke gases after the process in the tubular furnace, and these contain in slight quantities the toxic products CO, SO₂ and NO_x, as well as CO₂ in large amounts. All gases released in the startup period or in violations of the production procedure are burnt off. The radius of the health safety zone around an ammonia production plant is 1000 m. A table is given of the maximum permissible concentrations of harmful substances in the ground layer of air, for nitrous oxide, ammonia, carbon monoxide and sulfur dioxide, for population centers and in the working area of industrial enterprises. The height of stacks for exhausting smoke gases varies from 40 to 100 m. There is no contaminated water in the normal operation of a plant. Water discharges occurring in an emergency when equipment is washed is collected in a special tank from which it is sent out for the recovery of waste materials or it is processed by the plant's purification system. With regard to the fire protection of chemical reactors, special attention must be paid to the possibility of reducing the rate of chemical reactions either by cooling, stopping the flow or even by emergency evacuation. Equipment and pipelines must be protected against heat, cold, humidity, vibration,

corrosion, erosion and the appearance of leaks and overflows. For the purpose of conserving fresh water, in large plants for the production of ammonia air is widely used for cooling process flows and condensing water vapor. This measure has made it possible to reduce the consumption of cooling water from 25,000 to 3000 m³/h, has improved the reliability of equipment and at the same time has improved safe operating conditions. In addition, the corrosion of cooling equipment has been reduced and the possibility of unwanted gas and water mixtures has been eliminated. All technological equipment is placed in open areas; only compressors are located in buildings. The training of operators in key production sections begins at the majority of enterprises 16 months before the startup of a plant. An operator must be trained as a general technologist with a clear understanding of all processes taking place at all production stages. Existing local automatic safety systems do not satisfy the requirements for the safe and accident-free operation of large plants for the production of ammonia. Their major disadvantage is the fact that they evaluate a pre-accident and accident situation only in terms of individual parameters, but they are not able to prevent the development of accident situations originating because individual elements of automatic equipment go out of order. Computers are used at some plants to predict and prevent accidents, e.g., the M-6000 system at the Nevinnomyssk "Azot" [Nitrogen] Production Association. This system takes into account malfunctions of individual elements of automatic equipment. Data are given on reasons for unscheduled shutdowns of large ammonia production plants in the first three years of operation, on the length of lost time for these plants, on the reasons for and the length of this lost time for the periods of 1963-1969, 1963-1971 and 1969-1976, on the lost time of an ammonia plant in terms of its individual equipment, on the reliability of imported turbocompressors, on an annual analysis of shutdowns of imported compressors, on an analysis of the operation of oil pumps in an ammonia plant, and on the capacity for work of individual compressor components. Much of these data are collected from foreign sources. These data are discussed in terms of measures which can be taken for the purpose of improving the indicators reflected. Figures 2; references 26: 6 Russian, 20 Western.

[39]

MASTERY AND SAFE MAINTENANCE OF THE MULTITON PRODUCTION OF NITROPHOSPHATE FERTILIZERS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 360-363

LUBIS, B. A., Chief Engineer, Ionava Nitrogen Fertilizer Plant imeni the 25th CPSU Congress

[Abstract] A summary is given of problems overcome and of safety measures introduced in the mastery of the production of various kinds of nitrophosphate fertilizers at the Ionava Nitrogen Fertilizer Plant imeni the 25th CPSU Congress in the Lithuanian SSR. The production of nitrophosphate fertilizers at this plant is based on the decomposition of an apatite concentrate with nitric acid and binding the excess calcium with sulfuric acid into a sulfate. Phase one of the process was introduced in 1975 and phase two in 1977. A chief problem, not entirely overcome, has been the precise dispensing of initial components. Dispensers of free-flowing materials have worked satisfactorily, but dispensers of acids and gaseous ammonia are still causing a lot of trouble. The lack of automatic commercial pH meters has made it difficult to maintain the required pH. One stage in the production of a nitrophosphate fertilizer is granulation and drying of the pulp, which is carried out in combination dryer-granulator-classifiers. A great amount of work is being done to provide safe conditions for the operation of this equipment in order to prevent the thermal decomposition of the nitrophosphate fertilizer and the consequent release of a great amount of contaminants--oxides of nitrogen, chlorine and fluorine, etc.--in production areas. Experiments have demonstrated that the self-decomposition occurs from overheating of the fertilizer and that the temperature of thermal decomposition depends on the duration of the heating. It has been determined that for the purpose of avoiding the self-decomposition of a nitrophosphate fertilizer during the drying period the composition of the pulp should equal: $N_{\text{amm}} \approx 6.4$ percent, $N_{\text{nit}} \leq 5.15$ percent, $SO_4^{2-} \geq 18.5$ percent and $Cl \leq 18.9$ percent, with a pH of 4.9 to 5.1 (excluding moisture). Having a great influence on self-decomposition are conditions of the granulation process, such as temperature conditions, the composition of the entering pulp and its pulverization, and adhesion to the walls and blades of granulators. Analyses were made of exhaust gases from the granulator at different periods after a cleaning. The liberation of gases increases with an increase in the amount of nitrophosphate fertilizer adhering to the blades and walls of the combination unit. This is conducive to the start of thermal decomposition. The combination unit proved to be unsatisfactory and had to be reconstructed; the stages in this reconstruction are detailed. When cleaning the combination unit,

adhesion is prevented by employing anti-adhesion materials which maintain the temperature to a maximum of 320°C and have sufficient mechanical strength. These coatings are applied to the inside surface of the unit. Measures taken to improve sanitary conditions at work places and to reduce effluents include the use of dust-trapping vacuum pumps. Cyclone dust separators are employed. The discharge of dust with exhaust gases has been reduced. Cyclone dust separators now trap 93.9 percent of the dust. In the production process the reactors release gases containing volatile components, i.e., oxides of nitrogen, vapors of acid, gaseous compounds of fluorine, and ammonia. Absorption is performed at 65 to 80°C and 100 to 400 mm Hg. Various methods which have been used to absorb these volatile components are discussed. The catalytic, adsorption and absorption methods of cleaning off oxides of nitrogen are discussed. The only suitable method for cleaning the gas from the production of a nitrophosphate fertilizer is absorption with alkaline solutions. A diagram is given of the absorption method now used. The new method of cleaning exhaust gas from the production of a nitrophosphate fertilizer has made it possible to increase the degree to which NO_x and fluoride compounds are trapped to 30 to 40 percent. A changeover has been made from soda cleaning of the exhaust gas to carbamide-carbamate cleaning; this new method has made it possible to control the process conveniently, to reduce the corrosion of equipment considerably and to almost eliminate the clogging of equipment. Measures taken to simplify the production process and improve the reliability of equipment have resulted in the elimination from the process equipment of 76 different units. This has resulted in facilitating the work of operating personnel and in ensuring the stability of the equipment's operation at maximum loads. Figures 1; references 10: 6 Russian, 4 Western.

[39]

CSO: 1841

EXPERIMENTAL WORK WITH FERTILIZERS IN THE SYSTEM OF THE STATE AGROCHEMICAL SERVICE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 7 1979 pp 4-6

CLISHKO, A. A., Candidate of Agricultural Sciences [CAS], TKACHENKO, D. F., CAS and VASILENKO, M. G., CAS, Kiev Branch of the TsINAO

[Abstract] Zonal (oblast) agrochemical laboratories of the Ukr SSR carry on, every year, thousands of tests on farms serviced by them to get insight into effectiveness and ratios of mineral fertilizer doses used on the republic's farms. Guidance for their recommendations on doses is thus achieved. Field trial results are processed by computers. Organization of this work at the Volynskiy, Dnepropetrovskiy, Zaporozhskiy, Crimean (which has a staff of 22 people) and L'vovskiy agrochemical laboratories is praised. These laboratories have groups of 3 assigned to field trials. Students who assist apparently earn study credits. Shortcomings are noted: lack of scientific personnel, shortage of equipment, too much area for too few people to cover. Methods must be developed, specifics of areas tested must be learned, financial support must be provided. Plans for improving agricultural yields will be accomplished by well-run field and production experiments.

[30-8586]

USSR

FRONT RANK PEOPLE IN THE AGROCHEMICAL SERVICE IN VORONEZH OBLAST

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 7 1979

KIPROCHENKO, V. V., Head of the Voronezh Oblast Agrochemical Laboratory

[Abstract] Tribute is paid to those who have contributed to yield increases in the Oblast, e.g., at the "Novousmanskii", "Krylovskiy", and Lenin sovkhoses and the Path of Lenin kolkhoz. These people include N. S. Averkin, a senior agrochemist (for fertilizer use) and N. S. Aksenov, senior agrochemist at the "Path to Communism" kolkhoz, for use of fertilizer and for organization. His kolkhoz has been a steady model and achiever over the years, with his help.

[30-8586]

THERMAL DECOMPOSITION OF NITROAMMOFOSKA AND NITROFOSKA

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 5 1979 pp 50-52

MOSHKOVICH, F. B., Candidate of Chemical Sciences, PODSHIVALOVA, G. N., RUCHKINA, M. I. and STRIZHEVSKIY, I. I., Candidate of Chemical Sciences, State Scientific Research Institute of the Nitrogen Industry and Products of Organic Synthesis

[Abstract] Note is taken of the potential breakdown of complex fertilizers by heat, especially the title decomposition. This report evaluates the dangers of spontaneous decomposition on heating of the nitro fertilizers. The heat source was an incandescent lamp as a common initiator of thermal decomposition; the lamp capacity was 40 and 100 watts, corresponding to 450 and 1120 cal/min. No self-propelled spread of decomposition around a source of heat, with nitroammosfoska, occurred. Temperature at the start of decomposition of the nitroammosfoska was 217-220°C, approximately 20°C above that for nitrofoska; the former thus presents less potential danger than the latter. Tests to determine whether additives of trace elements influenced the temperature for start of thermal decomposition showed that the presence of trace elements had no such effect. Graphs display thermograms of decomposition of nitroammosfoska and nitrofoska. Figures 4; references 5: 2 Russian, 3 Western.

[29-8586]

STANDARDS FOR SOWING WINTER WHEAT AND THE ECONOMIC EFFECTIVENESS OF MINERAL FERTILIZERS UNDER THE CONDITIONS OF THE UKRAINIAN SSR FOREST STEPPE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 5 1979 pp 47-50

SHEVCHENKO, An. I., Candidate of Agricultural Sciences, and SHEVCHENKO, Al. I., Mironovskiy Scientific Research Institute of Selection and Wheat Seed Culture

[Abstract] The present study was done in 1974 to 1977 in the central area of the right bank of the Ukrainian forest steppe--by the Mironovskiy Wheat Selection Center--under prevailing unstable moisture. The wheat (Mironovskaya 10 and Il'vichevka) was sowed after corn. Precipitation

varied from 404 to 650 mm per year on the average. Procedures of the All-Union Scientific Research Institute of Fertilizers and Soil Science were used to evaluate economic effectiveness of the mineral fertilizers. Effectiveness, in terms of rubles, is tabulated exhaustively against standard sowings of seeds, i.e., 3,4,5 and 6 mil seeds per hectare, and against fertilizer variants, e.g., none, P50K60, N60P60K60, the latter + N30 in the spring, or spring and fall, N90P90K90 and N120P60K60. Data suggest that Il'yichevka gives better yields than Mironovka 10 over the specific selected conditions of sowing, fertilizer and soil conditions. References 8 (Russian).

[29-8586]

USSR

UDC 632.95.024

TOXICITY OF PESTICIDES FOR THE IMAGO OF ENCARSIA FORMOSA

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 5 1979 pp 36-38

LEBEDEV, V. V. and PETRUSHOV, A. Z., Candidates of Biological Sciences

[Abstract] *Encarsia formosa* has been used to combat the greenhouse whitefly. Conflicting reports on its susceptibility to pesticides exist and this work has examined various pesticides to find which would not affect the *encarsia* imago. Substances studied include aktellik, akreks, benlate, karatan, carbofos, kelton, orten, pirimor, tedion and rogor. Toxicities of the pesticides are graphed and tabulated. It is concluded that when *encarsia* is used to biologically control the whitefly over a covered ground, minimal use is to be made of chemical agents, especially organophosphorus pesticides. Figures 2; references 8 (Western).

[29-8586]

USSR

UDC 63.18.022.3

MOSCOW OBLAST PRODUCTION-SCIENTIFIC AGROCHEMICAL ASSOCIATION: TASKS AND ACHIEVEMENTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 5 1979 pp 6-9

MUKHIN, N. S., Chief [of the Association]

[Abstract] The title association was organized in 1974 to achieve more effective utilization of mineral and organic fertilizers, chemical materials for plant protection and to improve agrochemical servicing of sovkhozes, kolkhozes and other agricultural enterprises in the Moscow Oblast. Included in the association were the Moscow Oblast Planning-Research Station of Chemization of Agriculture and the Autotransport Enterprise, "Transsel'khoztekhnika". It has 33 agrochemical centers which service 400 farms (including 253 sovkhozes and 63 kolkhozes), involving 1.7 mil hectares of agricultural land of which 1.2 mil is plowed. Its tasks include direction of the agrochemical centers, the Oblast Station and the Transport enterprise, agrochemical servicing, preparation of guides for chemicalization, supply, storage of fertilizers, exploitation in practise of scientific achievements.

[29-8586]

USSR

UDC 631.821

STATUS AND PERSPECTIVES OF CHEMICALIZATION OF AGRICULTURE IN THE AMUR RIVER REGION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 5 1979 pp 3-5

MAVKIN, I. F., Second secretary of the Amur Oblast Committee of the CPSU

[Abstract] The Amur Oblast is known as the granary of the Far East. It has 2.5 million hectares of agricultural land, 1.8 million of which are plowed. It yields considerable soy, meat, milk and potatoes. Available electric power has doubled in the last ten years. Tractors are available; more than half of the Baykal Amur railway is on its territory; the Zeiskiy and Bureyskiy hydroelectric power stations are being completed; population is growing; animal husbandry is rising in volume. Plans to increase production are in being and agricultural activities are to be increased, including reclamation, which involves among other things overcoming acid soils. Chemicalization is a basic factor. A Biogeochemical

Laboratory (headed by V. V. Kovalskiy) was set up, in 1972, at the Amur Oblast Planning-Research Station for Chemization of Agriculture; it is guided by the Institute of Geochemistry and Analytical Chemistry imeni Vernadskiy, USSR Academy of Sciences. The laboratory is intensely examining the soil for its composition and shortcomings so as to recommend chemical treatment for its improvement (e.g., correcting low trace element and iodine content). Chemicalization has increased the agriculture yields of the Oblast and is expected to continue to do so.

[29-8586]

CSO: 1841

USSR

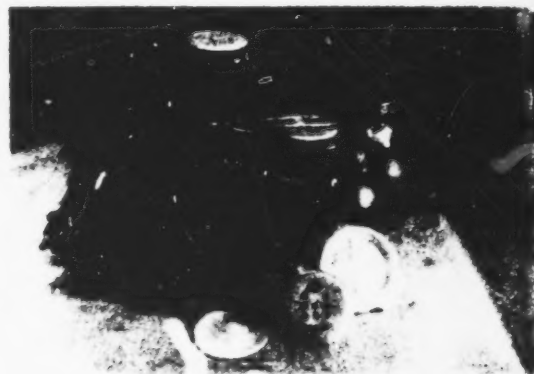
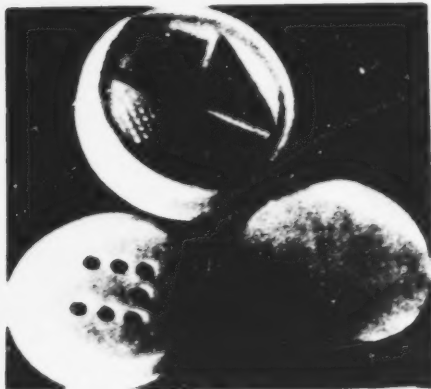
A LID WITH A MEMBRANE

Moscow KHIMIYA I ZHIZN' in Russian No 8, 1979 p 52

IONCHENKOVA, I. V.

[Abstract] A novel lid is described for jars used in preserving fruits and vegetables which permits storage in the fresh state for up to two months in the refrigerator. The lid is constructed of polyethylene with high molecular weight organosilicon components and consists of three sections: a frame, a grid, and a semipermeable membrane. Apparently the semipermeable membrane assures sufficiently higher concentrations of carbon dioxide and depressed oxygen concentrations to favor prolonged storage in the fresh state at +1 to +5°C. Figures 2.

[61-12172]



CSO: 1841

PRODUCTION OF PROTEIN FODDER YEASTS FROM PRELIMINARY HYDROLYZATE AT THE
BAYKAL PAPER AND PULP PLANT

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 6,
1979 signed to press 22 Aug 79 pp 8-10

ORLOV, V. I., Candidate in Technical Sciences, D'YAKONOV, L. A. and
VORSIN, V. V., Baykal Paper and Pulp Combine

[Abstract] The production of protein fodder yeasts from preliminary hydrolyzate of conifer wood (pine and larch) is described and a block diagram of the procedure is presented. A method for preventing "Caramelization" of the preliminary hydrolyzate by means of peptization of soluble lignin by a sulfite-yeast concentrate is described. This method greatly reduces the formation of "caramel" on equipment of the Baykal Paper and Pulp Combine. Physico-chemical indicators of preliminary hydrolyzates produced during production of cord cellulose from pine and larch are presented.

[23-2791]

PLASTEINS. PREPARATION, PROPERTIES AND USE IN NUTRITION

Moscow USPEKHI KHIMII in Russian Vol 48 No 9 Sep 79 pp 1684-1710

BELIKOV, V. M. and GOLOLOBOV, M. Yu., Institute of Hetero-organic Compounds,
USSR Academy of Sciences, Moscow

[Abstracts] This is an extensive review of the title subject. Interest in the plastein reaction--the re-formation of protein, by an enzyme, e.g., pepsin in an enzymatic hydrolysate of any protein--has enkindled with the growing need in the world for edible proteins. The reaction has potential for synthesis of high-quality proteins with desirable essential aminoacid content. Areas covered in the monograph are 1) conditions and reagents essential for the reaction; 2) physical properties and structure of plasteins (character as proteins; molecular weights, aminoacid composition, rheological properties); 3) factors affecting plastein reaction (protein source, structure of substrate, substrate concentration, enzyme used, pH of medium, temperature ionic strength of

medium); 4) incorporation of aminoacids in plasteins; 5) use of plasteins in nutrition (purification of proteins and use of proteins containing essential aminoacids, preparation of nutritive protein pastes and gels which are high-quality food or which improve foods as additives, attention to desirable organoleptic qualities). References 143: 19 Russian, 124 Western.

[25-8586]

CSO: 1841

USSR

UDC 543.24:543.80

QUANTITATIVE ASSAY OF HYDRAZIDES ON DIARYLPHOSPHINIC ACIDS BY POTENTIOMETRIC TITRATION WITH SODIUM NITRITE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 34 No 9 Sep 79
pp 1853-1855

YANCHUK, N. I., Ternopol State Pedagogic Institute

[Abstract] Phosphorus acid hydrazides and their derivatives find use as physiologically-active agents, polymers and agricultural chemicals. This article reports an effort for quantitative analysis of such hydrazides; analysis of such compounds has apparently been hitherto unavailable. This is the first report of use of NaNO_2 titration of phosphorus-containing hydrazides. Hydrazides of diarylphosphinic acids readily react with nitrous acid in an HCl medium to form the corresponding azidese. Acidity of the medium depends essentially on the course of the reaction. A procedure is described for quantitative potentiometric titration by NaNO_2 in 0.01-0.02 M HCl solution. Concentration of hydrazine in a test sample (P, %) is calculated by the formula

$$P = \frac{EMkV}{m} \cdot 100$$

where E is the hydrazide equivalent (numerically equal to its molecular mass), M is the molarity of the NaNO_2 solution, k is the correction coefficient for molarity of the NaNO_2 solution, V is the volume of NaNO_2 solution expended in the titration and m is the weight in mg of the hydrazide sample. References 8: 5 Russian, 2 Czech, 1 Rumanian

[55-8586]

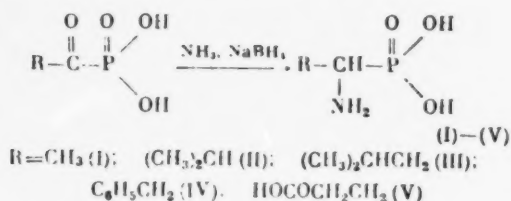
CSO: 1841

ORGANOPHOSPHORUS ANALOGS OF BIOLOGICALLY-ACTIVE SUBSTANCES. REPORT 5:
SYNTHESIS OF alpha-AMINOPHOSPHONOUS ACIDS AND SEVERAL DERIVATIVES OF
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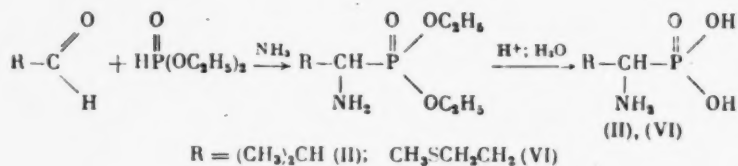
Moscow IZVESTIYA AKADEMII NAUK SSSR Seriya Khimicheskaya No 9 Sep 79
pp 2118-2122 manuscript received 5 May 78

KHOMUTOV, R. M., OSIPOVA, T. I., ZHUKOV, Yu. N. and GANDURINA, I. A.,
Institute of Molecular Biology, USSR Academy of Sciences, Moscow

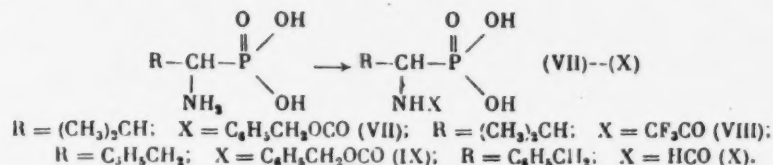
[Abstract] Aminophosphonous acids (APA) have found application in enzyme research, hence synthesis of new derivatives of these compounds was felt to be of practical importance. Production of APA is analogous to the synthesis of aminoacids. Khomutov, et al., synthesized APA by a one-step procedure described earlier (1978) by them:



Another procedure for APA syntheses is the aminophosponylation of aldehydes:



Using conditions analogous to those for aminoacids, the authors also produced N-formyl, N-trifluoroacetyl, N-carbobenzoxy derivatives of APA:



Chemical properties of the APA analogs are discussed. Detailed procedures are described for the syntheses. References 10: 3 Russian, 7 Western.

[50-8586]

USSR

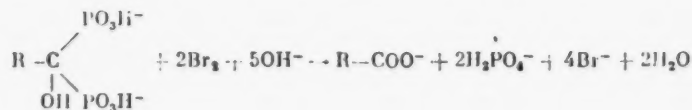
UDC 542.943:547.1'118

OXIDATION OF 1-AMINOALKYLIDENE-1, 1-DIPHOSPHONOUS ACIDS BY BROMINE IN A BICARBONATE SOLUTION

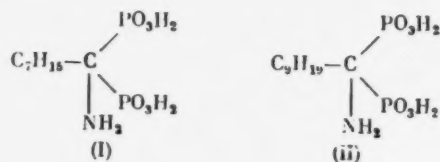
Moscow IZVESTIYA AKADEMII NAUK SSSR Seriya Khimicheskaya No 9 Sep 79
pp 2115-2117 manuscript received 15 Jun 78

ALFER'YEV, I. S., Kotlyarevskiy, I. L. and MIKHALIN, N. V., Institute of Chemical Kinetics and Combustion, Siberian Department, USSR Academy of Sciences, Novosibirsk

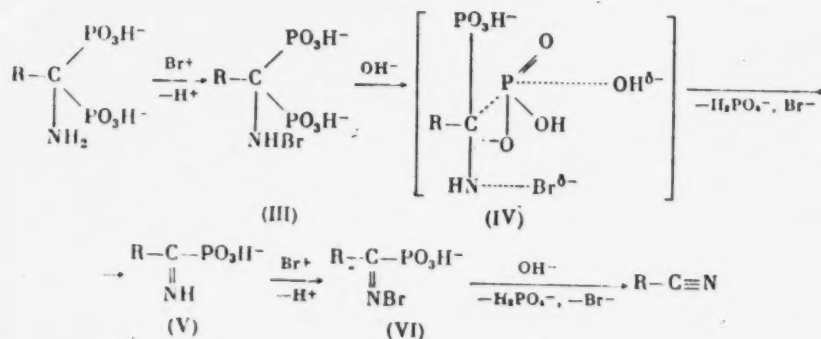
[Abstract] The oxidation of 1-hydroxyalkylidene-1, 1-diphosphonous acids with bromine in bicarbonate solutions to the carboxylic acids and phosphate has been shown (Blaser, et al., 1971) to proceed as follows:



Here the OH, which occupies an alpha position, is known to facilitate the oxidation. The present article examines the role of substances which contain an amino group in the alpha position:



Under reaction conditions, the bromine oxidation was found to lead to formation of nitrites, in the following suggested manner:



Reaction conditions, and spectrum identification of products are detailed. References 7: 1 Russian, 6 Western.

[50-8586]

CSO: 1841

INFLUENCE OF SOLVENT ON REACTIONS OF ALKENES WITH PHOSPHORUS PENTACHLORIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR, Seriya Khimicheskaya No 9 Sep 79
pp 2108-2114 manuscript received 14 Jun 78

KULOMIYETS, A. F., FOKIN, A. V., KROLEVETS, A. A., PETROVSKIY, P. V.
and VERENIKIN, O. V.

[Abstract] It was found that reaction of PCl_5 with alkenes is substantially simplified under conditions which promote dissociation of the PCl_5 into a PCl_4^+ cation or the $\text{PCl}_4 \cdot \text{PCl}_6^-$ ionic pair, which confirms the ionic mechanism of the reactions. Various solvents for the reaction were tried: Me_2SiCl_2 , CH_2Cl_2 , aromatic hydrocarbons (benzene or toluene), AcCl and MeCN . A series of eight alkenes (tabulated) were reacted with the PCl_5 . Data on polarity of the medium and in the donor properties of the solvent decrease the temperature for initiation of a reaction. The course of the reaction with PCl_5 is found to be a function of the structure of the alkene, the temperature for accomplishing the condensation and breakdown of adducts, alkanes, phosphorylated alkenes or 2-chloroalkanes. Extensive IR, PMR and NMR spectral data, and mass-spectra of the synthesized products are presented. References 11: 3 Russian, 8 Western.

[50-8586]

UDC 66.048.5:[661.7:547.261.118.3]

PURIFICATION OF DIMETHYL PHOSPHATE BY VACUUM DISTILLATION IN A FILM ROTARY EVAPORATOR

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, 1979 signed to press 11 Sep 79 pp 545-546

DEGTYAREV, V. V., KUKUSHKIN, V. V., VINNIKOV, Ye. A., KHLINOV, V. V.
and LOSKUTOV, L. G.

[Abstract] The possibility of use of a thin film evaporator for purification of dimethyl phosphate showed the dependence of the composition of the distillate and the productivity of the evaporator on the residual pressure, loading and temperature of the heat carrier. Schematic diagrams of the experimental apparatus and the film evaporator were presented. A mathematical model of the process which may provide the basis for control of the technological regime of distillation in the process was presented. References: 8.

[27-2791]

USSR

2,4-D AMINE SALT, 40% WATER-SOLUBLE CONCENTRATE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 8, 1979 pp 57-59

PARSHUTIN, S. M., All-Union Scientific Research Institute of Chemical Crop Protectants

[Abstract] 2,4-D amine salt, 40% water-soluble concentrate, is a selective systemic-action herbicide used to destroy annual dicotyledon weeds in the plantings of grain and certain other crops. Basic information on this herbicide is now provided. Treatment with this herbicide is not effective at an air temperature of 18-20°C and in the absence of rain for at least the first 5 hours afterward. 2,4-D is effective against fat hen (*Chenopodium album*), charlock, field pennycress, amaranth, sunflower windfall, cornflowers, shepherd purse, field forget-me-nots, quickweed, poppy, plantain, buttercups, certain species of bistort and dock, and also shoots of nettle and sowthistle. It is effective against persistent weeds when used in a combination with certain other herbicides. The applicable dosage of 2,4-D amine salt is 1.5-2.5 kg per hectare during the tillering stage, applied by spraying. This dosage can be lower or higher for specified types of weeds and crops. While 2,4-D is a relatively nontoxic herbicide, protective clothing is recommended for the spraying personnel. The herbicide is flammable and hence fire safety measures should be observed in its handling. Smoking is absolutely forbidden. 2,4-D should be stored in sealed containers. Its shelf life is two years.

[49-1386]

USSR

UDC 632.95.02

RESISTANCE OF INSECTS TO DICHLORVOS AND CHLOROPHOS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 8, 1979 pp 59-61

The late POPOV, P. V., the late SHAPOVALOVA, G. K. and GALITSINA, V. V., VNIKHSE

[Abstract] The formation of insect populations resistant to dichlorvos vapors and cross-resistant to other insecticides was investigated for the housefly. The attendant selection process resulted in flies in whom resistance to dichlorvos vapors increased slowly and even after selection

in the 72nd generation was no higher than 10x. The flies undergoing this selection process were found to have acquired relatively low cross-resistance (2-27x) to 15 other insecticides, except as regards chlorophos (70-230x). Thus the selection resulted in flies with low resistance to dichlorvos but extremely high cross-resistance to chlorophos. Resistance and cross-resistance stabilized beginning approximately with F₁₅-F₂₀. Given the resulting extremely high resistance to chlorophos, its practical application is contraindicated. The positive qualities of dichlorvos include its toxicity toward flies which have, owing to selection, become extremely resistant to other insecticides. The findings warrant the assumption that the mechanism of resistance (biochemical detoxication) is the same in dichlorvos and in chlorophos. The established difference in intensity of resistance to dichlorvos compared with chlorophos is attributable to the more rapid rate of chemical detoxication of chlorophos compared with that of dichlorvos. Figures 3; references 3: all Western.

[49-1386]

USSR

UDC 631.82:632.954

JOINT APPLICATION OF HERBICIDES AND FERTILIZERS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 8, 1979 pp 30-36

The late BOGDANOV, N. M. and ZALENYUK, T. A., Scientific Research Institute of Fertilizers and Insectofungicides imeni Professor Ya. V. Samoylov

[Abstract] Herbicides and mineral fertilizers are fairly often applied jointly, but little is known about their effect in such cases on weeds as well as on crop yields. This question can be elucidated only with the aid of a longtime experiment. Such an experiment has been under way since 1969 at the Dolgoprudnaya Agrochemical Experimental Station, with three crop-rotation systems, each based on three different crops. The results are now evaluated with respect to the first CRS cycle (1969-1974). The herbicides applied were pyramine, eptam, banvel-D, and 2,4-D. It was established that crop rotation (sugar beets, barley, oats, potatoes, vetch, winter wheat, grasses, flax) and the use of farming machinery destroyed fat hen (*Chenopodium album*) in the agrophytocenosis. However, the weed infestation of the sowings increased by a factor of 1.4-1.7 times as an aftereffect of the application of fertilizers. On the fertilized fields, matricary, hemp nettle, fumitory, and certain other weeds proliferated to a greater extent than on the unfertilized fields and thus began to predominate in the phytocenosis. It is concluded that

the level of weed infestation of sowings increases in direct proportion to the fertilizer dose owing to the increase in both the number and quantity of weeds. Some weeds (fat hen) then get completely eradicated while others, more resistant, begin to proliferate. Thus the attendant short-term application of herbicides does not reduce the overall level of weed infestation, since their toxic effect is offset by the positive effect of fertilizers on weed growth. Effective weed control can be achieved only by tailoring specific herbicide systems to every particular crop rotation system, and this still requires further research.

[49-1386]

USSR

UDC 632.954

FENAZON (60% WETTING POWDER)

Moscow KHIMIYA V SEL'SKOM KHOZHAYSTVE in Russian Vol 17 No 7 1979 pp 47-78

PARSHUTIN, S. M., Candidate in Agricultural Sciences, in consultation with the All Union Scientific Research Institute of Chemicals Used for Plant Protection

[Abstract] The title herbicide, used to control weeds, has a systemic action, penetrating plants through the roots and leaves; it is sprayed on the soil before appearance of weeds which are very sensitive to it in the seed stage. A list of the rather large number of weeds sensitive to fenazon is presented, as well as those weeds more resistant to it. In this article, which is in the nature of an instruction brochure, precautions, times for application, doses and methods of application--for various climates--are presented. Safety measures are cited, although the herbicide is only slightly toxic for animals--e.g., use of gloves, respirators, eye protectants. It should be stored in a dry state.

[30-8586]

CSO: 1841

USSR

UDC 632.954:635.342

USE OF TKHAN-87 AND SEMERON ON PLANTINGS OF WHITEHEAD CABBAGE UNDER IRRIGATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 7 1979 pp 44-47

KARASTYLEV, N. P., "Krasnopartizanskiy" Sovkhoz of Kustanayskaya Oblast

[Abstract] Cabbage growing in Kazakhstan urgently requires weed control. In the Kustanay Oblast, the plantings are made on the Toboi River flood plains which are weed-infested. TKHAN-87 [sodium trichloroacetate] has been successfully used for weed control and the present work describes its application in combination with semeron. Tests were done on the author's sovkhoz in 1974-1974--the TKHAN-87 was applied two weeks before planting and semeron twelve days after planting. Effectiveness of the program is tabulated. The combined use does lower weed contamination and, also, the amount of manual labor expended.

[30-8586]

USSR

UDC 632.954:631.562

USE OF HERBICIDES AGAINST OFFSHOOT WEEDS IN CROP ROTATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 7 1979 pp 39-41

IVANTSOV, N. K., Candidate of Agricultural Sciences, Velikie Luki Agricultural Institute

[Abstract] The weeds examined in this work were thistles, viz., the creeping thistle [*Cirsium arvense*] and the sow-thistle [*Sonchus arvensis*]. Studies were made in 1974 to 1978 on the "Ucrayskoye" teaching farm of the author's institute; crops in rotation were barley, lupine for silage and barley and clover. Herbicides tested were diamet-D, linuron + treflan, dicotex, tropotox and cis-67MEB (a mixture of 2M-4X and 2M-4XM). Weed contamination of the farm plots was very high and typical of the problem for the soil-and-climate zone. Success in control of the weeds could be achieved by combination of the herbicides with appropriate agrotechnical handling of the soil to provide destruction of the root system. References 3 (Russian).

[30-8586]

CSO: 1841

USSR

PETROCHEMICAL PROCESS INSTITUTE SOLVES PROBLEMS

Leningrad LENINGRADSKAYA PRAVDA in Russian 4 Oct 79 p 1

[Article by Zh. Manilova: "The Birth of a Giant"]

[Text] The collective of the All-Union Scientific Research Institute of Petrochemical Processes, founded at the very beginning of the First Five-Year Plan, has already been working for 50 years on designing new industrial processes for an important sector of the national economy--petrochemistry. The weight of its contribution lies particularly in the development of petrochemistry at Kirishi. The significance of the problems which the institute's specialists are now working on solving may be judged, for example, from one of the items of the socialist obligations taken on by the collective in the fourth year of the five-year plan:

"In order to accelerate the introduction of the institute's developments, to give scientific-technical assistance to the Permnfteorgsintez Production Association in launching the industrial complex for the production of diethylhexanol and butyl alcohols in accordance with a new method. Compared with the existing production facilities, this complex should ensure a reduction in the expenditure indicators for raw material and energy by at least 20 percent. The anticipated economic saving from one unit is 3 million rubles a year."

We will begin with the fact that the specialists of the oxosynthesis laboratory who are responsible for the fulfillment of this project, are at the final, and therefore a very crucial stage of work, of the laborious work of many years that is now being completed by introducing its results into industrial production. It is a question, as we can see from the socialist obligations, of a new, highly efficient industrial process for obtaining butyl alcohols and diethylhexanol--the most important initial products for the production of various plastics, insulating materials and leather substitutes. The scientists have been faced with this problem for a long time. It has become very critical, because the industrial process adopted for the petrochemical enterprises could not ensure obtaining the necessary amount of these petrochemical products nor, even more important, their high quality. The industrial flaws then made themselves felt in all the subsequent links of the complex production chain. As a result--the quality of the paint and varnish materials and plastic, leather substitutes and insulation materials in the cable industry is sometimes not high enough.

Maksim Petrovich Vysotskiy, head of the oxosynthesis laboratory and candidate of technical sciences, says that the difficulty of designing a new method was also complicated by the need to develop an industrial process for high-tonnage production of these products. In other words, he states, the entire undertaking would be only of a partial nature, and could scarcely affect the sector's progress. It was necessary to establish large-scale production, or rather--a complex of production facilities--on the basis of a highly efficient continuous production process, using the newest equipment and means of automation.

From the very beginning, therefore, the collective of Leningrad scientists could see the solution to this important national economic task.

By now the collective has had solid experience in working out industrial processes for high-tonnage production. This was the service of the founder of the laboratory Professor D. M. Rudkovskiy, and this was a serious situation, in other words, perhaps, the problem would prove to be beyond its powers. There is a second factor. It was just at that time that the institute set up close creative relations with the scientists of the national enterprise of the Walter Ulbricht Leyn-Werke in the GDR. Just as the Leningrad specialists the German chemists worked hard and in earnest on oxosynthesis processes, that is, the process of forming complex products containing oxygen. In addition, they had a semi-industrial unit to finish up the work on the new production processes.

In a word, the preliminary meetings and discussions with our German comrades were completed to mutual satisfaction by an intergovernmental agreement between the USSR and the GDR. The work began.

The head of the laboratory and director of the topic, K. A. Alekseyeva, candidate of chemical sciences, as well as communist N. I. Yefimova, senior engineer, and all the others both veterans and quite young--participants in this major work are rather hesitant to speak today of the difficulties that they have, of course, encountered. They remember rather, how the entire collective of the laboratory rejoiced when they were able to surmount these difficulties and complete a certain specific stage of research. Then they speak with great respect of the German colleagues and of the close creative friendship that was born and strengthened in the combined work.

It must be said that from the very beginning, a council of specialists was set up to direct the work group and coordinate the research. The USSR group was headed by M. V. Zinin, deputy chief of the Soyuznefteorgsintez Production Association, and the GDR group--by Doctor Hans Baltz, chief of the scientific research division of the Leyn-Werke national enterprise. The work group itself consisted of very experienced specialists.

M. P. Vysotskiy says that he could name many highly qualified laboratory associates, but then adds that he considers the work of each participant in the research useful and necessary. On the other hand, when speaking of the work, he repeatedly mentions the names of German colleagues--Doctor Sigfried Poredda and Doctor Rudolph Shmuk. Maksim Petrovich spoke of them as high-class specialists. Collaboration with them, he added, afforded the entire laboratory collective true creative satisfaction.

The design of the new industrial process was concluded when at Perm, at the Permnefteorgsintez Association, the construction of a large-scale industrial complex was begun. It should become a pioneer in the sector with respect to high-tonnage production of scarce monomers in accordance with the new method.

A tense moment arrived: the construction of the complex limited the periods for working out the industrial process and rushed the designers and manufacturers of the equipment. They worked at full strength, under tension that they had not felt for a long time. They kept their word: The Leningrad workers issued all the necessary documentation by the deadline and the German machine builders supplied the necessary equipment to Perm'. Finally, the day arrived when, in the words of Viktor Stepanovich Fedorov, minister of the Petroleum Refining and Petrochemical Industry, a true petrochemical giant was put into operation. This was this summer, on 19 June--a day that Leningrad scientists consider to be for themselves both a holiday and a test at the same time. The unit, operating according to the new industrial process at that time yielded the first tons of products, needed by many sectors of the country's national economy. Of course, the unit's output at the planned capacity still needs time and the indispensable help of the Leningrad specialists. Tens of thousands of tons of critically scarce monomers a year --that is the capacity of just a single unit, and there will be two of them at the Perm' giant.

New worries have come up for the laboratory's associates. They are beginning the design of other advanced oxosynthesis processes, and at some of them the production will be able to be taken on after several years, and at others--in the more distant future. The status, however, of the head institute in the sector obliges the entire collective of the All-Union Scientific Research Institute of Petrochemistry to work today for the future. The Leningrad scientists see in this a pledge of progress in domestic petrochemistry.

[32-12151]

CSO: 1841

USSR

GAS REFINERY PROGRESS REPORTED FROM TASHKENT

Tashkent PRAVDA VOSTOKA in Russian 29 Sep 79 p 1

[Article by V. Shumaylov: "Mubarek Gas and Sulfur"]

[Text] Yesterday the second section of the Mubarek Gas Refinery yielded its output. With the planned capacity reached, the new units will make it possible for the enterprise to double its output. The country's main gas pipelines will begin to receive over 10 billion cubic meters of refined fuel per year, and the chemical plants--hundreds of thousands of tons of sulfur, which will make it possible to obtain millions of tons of mineral fertilizers in addition.

The Mubarek Plant is now one of the largest-scale enterprises of this sector in the country. Its expansion was undertaken in the 10th Five-Year Plan in connection with the opening up of new underground stores of natural gas with a high sulfur content in the south of Uzbekistan. For example, fuel from the Zevarda deposit was received for refining for the first time. In the near future, one more industrial line will begin operation--it will take gas from the deposit from Dengizkul' to Khauzak that is distinguished by an increased hydrogen sulfide and carbon dioxide content.

The second section of the plant was constructed within the period specified by the schedule, despite the delays that occurred at the start of the work. The collectives of construction and installation workers worked at shockwork rates, installing new domestic equipment manufactured in Moscow, in the Ukraine, in Belorussia and Estonia and in other regions of the country. The brigade of Aleksandr Kalinin, holder of the orders of the Medal of Honor and Labor Renown class III, gave an example of selfless work, technical creativity and great skill. The installation workers were twice awarded the title of "Best Brigade of the USSR Ministry of the Gas Industry." Members of this collective Valeriy Sabirov, Nikolay Dakombayev and Grigoriy Molanch developed a mastery of three jobs each, which helped them to overfulfill the plan regularly. At the beginning of the year Kalinin's brigade installed, in a matter of hours, the 240-ton absorber equipment without using hoisting cranes, with only small-scale mechanization devices. This made it possible to save thousands of rubles and to gain a great deal of time.

Highly efficient equipment has now gone into operation in the steppes near Mubarek that makes it possible to achieve a considerable increase in labor productivity. Due to putting equipment with a high unit capacity into operation, the second section was made 5 million rubles less expensive than the first, and occupies 4-fold less space. The automated control systems helped to reduce the number of personnel.

The operations workers took on the socialist obligation: to start up all the plant equipment for the planned operations ahead of schedule. In order to keep its word, the collective formed comprehensive brigades working at an increased rate--they are to put in effect the estimated productivity of the equipment. At the same time, the plant's workers decided to manage without calling in new workers and engineers: the Shchekinskiy method was adopted. The workers who resolved to master additional occupations are raising their level of knowledge through special courses.

[32-12151]

CSO: 1841

SYNTHESIS AND INVESTIGATION OF BROMINE DERIVATIVES OF BETA-ARYLHYDROXYETHYL NAPHTHENATES

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSSR, SERIYA FIZIKO-TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 5 1979 pp 67-71 manuscript received 13 Mar 79

NIYAZOV, A. N., ORAZDURDYYYEVA, G., BEREZHNOY, V. G. and MOLLAKOV, B. M., Institute of Chemistry, Turkmen Academy of Sciences

[Abstract] Bromine derivatives were synthesized through interaction of esters and bromine in carbon tetrachloride. Bromination of beta-arylhydroxyethyl esters of cyclohexane-carboxylic and native naphthenic acids yielded ethyl dibromines ["dibromine-substituted ethers"] and m-cresoxy-ethyl ether of cyclohexane-carbonic acid formed ethyl tribromine [tribromine-substituted ether], with only the benzene ring subject to bromination, and intact naphthene constituent. 2 figures; 5 Russian references.

[56-10,657]

COMPOSITION AND CHEMISTRY OF RESINOUS ASPHALTENE SUBSTANCES IN PETROLEUM FROM WEST TURKMENISTAN SITES

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSSR, SERIYA FIZIKO-TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 5 1979 pp 63-66 manuscript received 2 Mar 79

CHELPAKOVA, M. P., AYDOGDYEV, A., and SERGIYENKO, S. R., Institute of Chemistry, Turkmen Academy of Sciences

[Abstract] This is a continuation of studies of petroleum from Kotur-Tepe, Ovul-Toval and Burun sites. Separation and examination of petroleum residue recovered at temperatures above 500° from petroleum from the above sites revealed 27-29% tarry asphaltene substances in relation to crude oil. The resinous substances consist of undivided resins, resins soluble in phenol, insoluble in phenol and those eluted in carbon tetrachloride, benzene and alcohol with benzene. The residues of oil from these 3 sites are similar in resinous-asphaltene substance and sulfur content. There is a correlation between carbohydrates contained in the oil, composition and properties of the resinous asphaltene constituent. 1 figure, 2 tables; 7 Russian references.

[56-10,657]

USSR

UDC 553.981.553.048

REFINEMENT OF CLASSIFICATION OF PETROLEUM AND GAS RESOURCES

Ashkhabad IZVETSIYA AKADEMII NAUK TURKMENSKOY SSSR, SERIYA FIZIKO-TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 5 1979 pp 86-91 manuscript received 23 Mar 79

TACHMURADOV, B. M., Turkmenburgaz

[Abstract] The proposed refinement of classification of various categories of resources, based on exploration and estimation of contents of deposits and layers differing in structure would provide greater reliability of resources reported to the USSR State Commission on Mineral Resources and have a beneficial effect on immediate and long-term planning of gas recovery from specific petroleum and gas-bearing regions. 3 figures; 3 Russian references.

[56-10,657]

USSR

UDC 65.012.2.002.5

A MODEL FOR OPTIMIZING THE PRODUCTION PROGRAM OF PETROCHEMICAL ENTERPRISES IN THE PRESENCE OF VARIABLE COEFFICIENTS OF OUTPUT AND EXPENDITURES

Baku AZERBAJDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, 1979 pp 22-27

RZAYEV, T. G., Scientific Research and Project Design Institute of Overall Automation of Petroleum and Chemical Industry

[Abstract] A simple yet universal procedure for constructing a linear model for the optimal planning of operations of petrochemical enterprises with allowance for variability of coefficients of output and expenditures is presented. All input and output factors (consumption of raw and other materials and power, output of main products and byproducts) of each type of production are assumed to be independent variables. The model represents a linear programming analogue of a previously developed non-linear model. A formula for evaluating the dimensionality of the model is derived. The proposed procedure is applied to calculations of the production program of an enterprise refining petroleum and making chemical products. The introduction of the model at a number of enterprises has demonstrated its expediency and practicality. Figure 1; references 6; all Russian.

[43-1386]

USSR

UDC 517.461.054.001.5

INVESTIGATION OF THE SYNTHESIS OF N-SUBSTITUTED CARBOXYLIC ACID AMIDES
ON THE BASIS OF LIQUID PRODUCTS OF PYROLYSIS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 64-66

SHIKHALIZADE, P. D., MEKHTIYEV, S. I., GAYBOVA, E. M. and TABIYEV, R. B.,
VNIOLEFIN [All-Union Scientific Research Institute of Olefins];
Azerbaijdzhan Institute of Petroleum and Chemistry imeni M. A. Azizbekov

[Abstract] The possibility of synthesizing N-(phenylethyl)-acetamide by reacting styrene with acetonitrile and sulfuric acid was investigated. The optimal acetonitrile:styrene:sulfuric acid:water ratio was found to be equimolar. The maximum yield of N-(phenylethyl)-acetamide, 90.9%, was observed at a reaction temperature of 60°C and a reaction time of 1 hr. The chemistry of the course of the reaction was analogous to that of the synthesis of N-(phenylethyl)-amide of metacrylic acid by reacting metacrylonitrile with styrene. The polymerizability of the unsaturated nitrile used in the reaction apparently is not a major factor in the synthesis of N-(phenylethyl)-amides--it is rather the reactivity of the nitrile group itself that is the principal factor here, while the structure of the radical bound to it does not directly affect the synthesis reaction. Figures 2; references 3: 2 Russian, 1 Western.

[43-1386]

USSR

UDC G 553.22, G 553

INVESTIGATION OF THE EFFECT OF GAMMA RADIATION ON THE HIGH-PARAFFIN CRUDE
FRACTION BOILING AT 60-150°C

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 61-63

MELIKZADE, M. M., SUBKHANVERDIKHANOV, A. E., DADASHEVA, E. K. and
MAMEDOVA, B. A., Azerbaijdzhan Civil Engineering Institute

[Abstract] The UV irradiation of hydrocarbons and fuels is known to result in the formation of a considerable quantity of peroxides. In this connection in view of the growing possibility of developing new technological processes based on utilizing the energy of radioactive radiation, the effect of various types of irradiation on hydrocarbons and petroleum products should be researched. Accordingly, the effect of

gamma irradiation on the 60-150°C fraction isolated from high-paraffin crude was investigated. Irradiation in doses of $0.3 \cdot 6 \cdot 10^8$ rad was found to affect insignificantly the physico-chemical properties of that fraction. Similarly, chromatographic analysis revealed that, in the presence of the above doses, the hydrocarbon composition of the fraction in question underwent only insignificant chemical changes. I. e., gamma irradiation caused some increase in the amount of unsaturated hydrocarbons and the alkenes and naphthenes underwent some intramolecular realignment, but on the whole the changes in the 60-150°C fraction following its gamma irradiation were not substantial owing to the presence of a considerable proportion of aromatic hydrocarbons which produced a stabilizing effect on the irradiated system. Figures 3: all Russian.

[43-1386]

USSR

UDC 547.5.514

FREE-RADICAL ADDITION OF CYCLANONES TO UNSATURATED HYDROCARBONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 42-46

SULEYMANOVA, E. T., MEKHTIYEV, S. D., ALIMARDANOV, Kh. M., BABA-ZADE, S. S., KASUMOV, L. I. and MIRGASANOVA, M. I., Institute of Petrochemical Processes imeni Yu. G. Mamedaliyev

[Abstract] The effect of the structure of cyclanones and unsaturated aliphatic- and alicyclic-series hydrocarbons on the yield and composition of their free-radical-initiated addition in the presence of tert-butyl peroxide was investigated. The experiments were conducted in a metal vial under reactant vapor pressure in the presence of a ketone-olefin-peroxide molar ratio of 4:1:0.15 at 160°C for 4 hr. The reaction products were subjected to chromatographic analysis. It is established that, in terms of reactivity to free-radical-initiated addition to unsaturated hydrocarbons, the investigated alicyclic ketones can be aligned in the following diminishing series: cyclopentanone > 3-methylcyclopentanone > cyclohexanone, 4-methylcyclohexanone > 2-methylcyclopentanone > 2-ethylcyclopentanone. The introduction of the alkyl substituent into the alkylated ketone molecule increases the yield of reaction products--alkylcyclanones. In terms of reactivity at initiated addition to cyclanones the investigated unsaturated hydrocarbons may be aligned in the following diminishing series: n-alkenes-1 > isoalkenes-1 > cycloalkenes > alkylcycloalkenes. References 10: 7 Russian, 3 Western.

[43-1386]

USSR

UDC 66.095.7

SYNTHESIS OF N-OCTYLETHYLAMINE BY REDUCING N-OCTYLACETAMIDE WITH LITHIUM ALUMINOHYDRIDE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, 1979 pp 28-32

ISMAYLOV, F. K., ALIYEVA, S. A., AVANESOVA, S. S., GADZHIYEVA, Kh. M. and SHAKHTAKHTINSKIY, T. N., Institute of Problems of the Theory of Chemical Technology

[Abstract] In view of the rising demand for alkylamines the possibility of utilizing N-substituted amides for amine synthesis is being explored. Such amides, however, are relatively unreactive compounds and their reduction is a complicated process. In this connection, experimental findings on the synthesis of N-octylethylamine from N-octylacetamide obtained by condensing acetonitrile with diisobutylene in the presence of acid catalysts are presented. The reduction was accomplished directly by adding droplets of ester solution of the amide to a suspension of lithium aluminohydride. It is shown that the optimal reaction temperature is the boiling point of the solvent used--35°C for diethyl ester, and 65°C for tetrahydrofuran. The maximum yield of the amine (mol.% 71.44) under these conditions was achieved in the presence of a molar ratio of 1.25:1 between lithium aluminohydride and amide, on using diethyl ester as the solvent. Increasing the reaction time from 2 to 12 hr resulted in increasing the yield of N-octylethylamine from 71.44 to 79.60 mol.%. Figures 2; references 4: 2 Russian, 2 Western.

[43-1386]

USSR

UDC 541.123+65.091.18

INVESTIGATION OF THE CATALYTIC PROPERTIES OF URANIUM-ANTIMONY CATALYSTS OF THE OXIDATIVE DEHYDROGENATION OF ISOAMYLENES

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 6-12

NAGIYEV, T. M. and ZUL'FUGAROVA, S. Z., Institute of Basic Research Into Chemical Technology

[Abstract] The activity of uranium-antimony catalysts was investigated as a function of their ingredients and phase composition. 3 different catalyst specimens were investigated: one without a carrier (I) and two

(II and III) with a carrier $X = Al_2O_3$, but differing in their content of active ingredient--6.6 and 14 wt.%, respectively, for II and III. Physicochemical (derivatographic, x-ray structural, and IR-spectroscopic) analyses established the presence of the phase $USbO_5$ in specimen I, representing a mixture of the oxides of uranium and antimony, following calcining at $800^\circ C$. The carrier-based specimens II and III reveal the presence of the phase USb_3O_{10} following calcining at $800^\circ C$, along with reflection lines characteristic of the higher oxides of uranium and antimony. The optimal catalyst was found to be the one containing the larger amount of the active phase USb_3O_{10} , that is, specimen II: its activity with respect to the yield of isoprene was 1.34 times as high, and its selectivity, 1.02 times as high, compared with the indicators for specimen III. Thus, physicochemical and catalytic analyses demonstrate that the optimal composition of the Al_2O_3 -based uranium-antimony catalyst is the one containing 6-8% of the active ingredient. Figures 3; references 8: 5 Russian, 3 Western.

[43-1386]

USSR

UDC 541.1283

INVESTIGATION OF DYSPROSIUM OXIDE AS A PROMOTER OF THE ACTIVITY OF ALUMINUM-CHROMIUM CATALYST IN THE n-BUTANE DEHYDROGENATION REACTION

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3 1979 pp 3-5

ZUL'FUGAROV, Z. G., EFENDIYEV, A. G., ALIYEVA, D. A. and MAMEDANDZE, N. Yu.,
Institute of Inorganic and Physical Chemistry

[Abstract] The effect of dysprosium oxide as a promoter of the activity and stability of the aluminum-chrome catalyst in the dehydrogenation of n-butane into butylenes was investigated. The factors considered were the temperature of the process and the amount of the promoter Dy_2O_3 in the composition of aluminum-chrome catalysts containing different quantities of Cr_2O_3 (6.0, 12%) in relation to the activity and stability of the catalysts. It was found that Dy_2O_3 is a satisfactory promoter when used for this purpose, particularly in the catalyst containing 12% Cr_2O_3 . The optimal amount of Dy_2O_3 to be added is 1.0% of the amount of the active component (Cr_2O_3). Then the activity and stability of the Dy_2O_3 -containing catalyst are 1.5-2.2 times higher than those of the catalyst K-5. The promoter principally interacts with the active component-- Cr_2O_3 --of the catalyst, and this results in stabilizing the catalyst's activity in the presence of high-temperature steam. References 9: all Russian.

[43-1386]

USSR

UDC 542.61.3/5:665.41

EXTRACTIONAL PURIFICATION OF SOLID PARAFFINS WITH DIMETHYLFORMAMIDE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 6-8

TARASOV, D. K., PEREVERZEV, A. N., and FADEYEV, V. S.

[Abstract] Gas chromatography, UV and IR spectroscopy were employed in analyses of solid paraffins before and after extractional purification with dimethylformamide (DMF). Studies conducted with brands T and B₄ paraffins showed that extraction with DMP improves the quality of the paraffins in terms of color, oil content, and stability as a result of elimination of low melting point paraffins, as well as of aromatic and oxygen-containing compounds. The latter products may be utilized in coking. Tables 2; Figures 3; References: 2 Russian.

[58-12172]

USSR

UDC 665.637.733:537.212

DEPARAFFINIZATION OF RESIDUAL CRUDE IN A HETEROGENOUS ELECTRIC FIELD

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 3-6

KAZAKOVA, L. P., GUNDYREV, A. A., ABASZADE, M. N., and SIDOROVA, N. V., MINKH and GP [expansions unknown] imeni I. M. Gubkin

[Abstract] Results are presented of the use of heterogenous electric fields in the deparaffinization of raffinate obtained from Siberian oil fields. Optimum results were obtained under the following conditions: solvent (Galosh benzine) to raffinate ratio 1:6 (mass), 60°C thermal treatment, 2-4°C/min rate of cooling to a working temperature of -25°C and 33.5 kV/cm electric field for 180 s. Tables 2; Figures 4; References 6: 2 Russian, 4 Western.

[58-12172]

CSO: 1841

USSR

UDC 542.973.8:621.928.028.4

GRANULAR FILTERS FOR PURIFICATION OF BEAD CATALYST REGENERATING GASES
AT CATALYTIC CRACKING PLANTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 16-17

SIDORENKO, N. A., BAGDASAROVA, V. A., and BASHKARDIN, V. Ya.

[Abstract] Evaluations were made of granular filters used in the purification of bead catalyst regenerating gases at experimental catalytic cracking plants. The results showed that continuous operation for 250 h under the conditions described eliminates about 96.4% of the dust from the gas when the filter is subjected to a gas load of $1080-1130 \text{ m}^3/(\text{m}^2 \cdot \text{h})$. Scale-up has been devised for the employment of this approach at the Novokuybyshevsk refinery. Figures 2; References: 1 Russian.

[58-12172

USSR

UDC 543.87+65.521.3

TENDENCY OF JET FUELS TO FORM DEPOSITS ON HEATED SURFACES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 17-20

SEREGIN, Ye. P., GORODETSKIY, V. G., GOLENEV, N. P., and PROKUDIN, V. N.

[Abstract] Studies were conducted on the tendency of various aviation fuels to form deposits on heated surfaces which demonstrated that DTS-2 test equipment was best suited for such investigations. Data are presented for several fuels (T-1, TS-1, RT, and T-6) on the relationship between the degree of refining, thermostability, and the temperature at which deposits first occur. The temperature ranges at which deposits begin to appear are $85-100^\circ\text{C}$ for T-1 and TS-1, $135-180^\circ\text{C}$ for RT, and $180-190^\circ\text{C}$ for T-6. The techniques outlined here may be used for the design of appropriate aviation fuels to meet various requirements. Tables 2; Figures 1; References: 8 Russian.

[58-12172]

CSO: 1841

USSR

UDC 62-634.2:536.5:66.092.1

DETERMINATION OF THE DECOMPOSITION TEMPERATURES OF JET FUELS FROM THE
HARDNESS FACTOR

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 20-22

BUKHARKIN, A. K., and KOVALEV, G. I.

[Abstract] The influence of the hardness factor was evaluated on temperature decomposition of several aviation fuels in a system in which the duration of exposure to a given temperature was monitored within the range of the cracking zone. The results demonstrated that the hardness factor, $f = t \tau^{0.06}$ (where t is temperature in $^{\circ}\text{C}$ and τ = time), can be used in determining the starting temperature for decomposition. For fuels RT, TS-1, T-8B, and T-6 the hardness factor at which thermal decomposition commences is within the range of 635-655. Tables 3; Figures 1; References 4: 1 Western, 3 Russian.

[58-12172]

USSR

UDC 62-634.2.004.4

CHANGES IN THE PROPERTIES OF FUEL T-6 ON PROLONGED STORAGE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 22-24

MELENT'YEVA, N. I., MALYSHEVA, I. V., KALITINA, N. N., and SAVIN, L. N.

[Abstract] Determinations were made of various properties of hydrated T-6 fuel stored for 2 years in surface metal tanks in the northern climatic zone under excess air-vapor pressure of 2 kPa. The results showed that under these conditions the quality of the fuel did not deteriorate. Tables 2; References: 7 Russian.

[58-12172]

CSO: 1841

USSR

UDC 621.892.09:546.212

EFFECT OF WATER ON THE PERFORMANCE OF MINERAL OILS WITH MINERAL ADDITIVES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 24-27

KICHKIN, G. I., KLEYMENOVA, Z. A., and POSTNIKOVA, N. G.

[Abstract] Several samples of DS-11 oil with detergent additives and three commercial motor oils were tested for the extent to which water (1% in oil) washed out the additives. In terms of the ash content, approximately 2-40% of the ash content was lost. Water treatment also led to a decrease in alkalinity, but the latter was unrelated to the ash content. Barium additives were removed 1.5-2 times more efficiently than calcium additives; however, the detergent properties of the oils did not change significantly. Tables 4; References: 4 Russian.

[58-12172]

USSR

UDC 621.892.09:625.282.004.18

ECONOMIC USE OF MOTOR OIL IN DIESEL LOCOMOTIVES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 27-30

ADAMENKO, S. P., and ZALENETSKAYA, I. S.

[Abstract] Various factors were analyzed on the consumption of motor oil by diesel locomotives which showed that, on the whole, in the case of majority of the diesel models oil consumption is too great according to current standards regulating oil changes. In general, cleanliness can be assured by more efficient operating conditions, improvements in the filtration system, and increasing the content of oil with an alkaline index of 9-11 mg KOH/g. Figures 3; References 4: 1 Western, 3 Russian.

[58-12172]

CSO: 1841

USSR

UDC 665.63:66.012.4.24

METHODS AND PRACTICE IN ESTIMATING PRODUCTIVITY OF REFINERIES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 30-34

SHAPIRO, Ye. A.

[Abstract] A brief survey is presented of the methods employed in estimating the productive capacity of a refinery and of methods that may be implemented to insure a further increase in productivity. Emphasis is placed on the factors that enter into calculations of productive indicators and examples are provided of pertinent calculations. References: 2 Russian.

[58-12172]

USSR

UDC 543.544:543:80

CHARACTERISTICS OF THE GASOLINE FRACTION OBTAINED BY THERMODESTRUCTION OF BITUMINOUS OIL

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 35-37

KLEYEV, A. M., MARGULIS, B. Ya., MARTYNOV, A. A., and VIGDERGAUZ, M. S., IOFKH [expansion unknown] imeni A. Ye. Arbuzov

[Abstract] A chromatographic evaluation of the 35-95°C gasoline fraction obtained by thermal decomposition of bituminous oil was carried out. The initial analysis involving liquid chromatography in conjunction with fluorescent indicator spectra pointed to the presence of aromatic, olefinic, and paraffin fractions, which were subsequently analyzed by gas chromatography. The final results indicated that thermal destruction by means of a gas generator yields products similar to those obtained by oxidative cracking. Figures 4; References 11: 3 Western, 8 Russian.

[58-12172]

CSO: 1841

USSR

UDC 66.022.37:539.538

NOVEL ASH-FREE ANTIWEAR ADDITIVES TO LUBRICATING OILS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 37-39

ROGACHEVSKAY, T. A., LASHKHI, V. L., VIPPER, A. B., MALYSHEVA, T. G.,
KAYDALA, Ye. V., and KLEYMENOVA, Z. A.

[Abstract] Several derivatives of triazine were investigated as ash-free additives to lubricating oils and shown to possess promising antiwear properties. Adsorptive properties of the triazine derivatives were dependent on their structure and composition. In terms of thermal stability the triazine derivatives were equivalent to the zinc dithiophosphate additives; several triazine compounds approached zinc dialkyldithiophosphate in antiwear properties. Tables 4; References: 3 Russian.

[58-12172]

USSR

UDC 66.097.7:620.193

EFFECTS OF MODIFIERS ON THE PROTECTIVE PROPERTIES OF THE AKOR-1 CORROSION INHIBITOR

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8 1979 pp 40-41

KOPYLOV, L. I., SHEKHTER, Yu. N., GUREYEV, A. A., BOGDANOVA, T. I.,
and BAKALEYNIKOV, M. B.

[Abstract] Physicochemical and electrochemical tests were conducted to evaluate the effects of various additives on improving the anti-corrosive properties of the leading Soviet product AKOR-1. The final results showed that speed of action and protective properties were most improved by the addition of BK-6 alkylolamides, which made it almost comparable with calcium alkylbenzene sulfonate in terms of corrosion inhibition. Tables 1; Figures 1; References: 3 Russian.

[58-12172]

CSO: 1841

CRACKING IN THE IMMOBILE LAYER OF AN ALUMOPHENYLSILOXANE-MODIFIED CATALYST

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 53 No 9 Sep 79 pp 2300-2302
manuscript received 11 Dec 78

KOLESNIKOV, I. M. and BELOV, N. N., Moscow Institute of the Petroleum
Engineering and Gas Industry imeni I. M. Gubkin

[Abstract] This is a description of experiments to extend the life of industrial aluminosilicate catalysts--which lose activity due to changes in porosity, structure of the polyhedrons and caking--by coating the surface of the catalysts with alumophenylsiloxanes. A kerosene-gas oil fraction of Malgobekskaya petroleum (chemical content and physical chemical properties of which are given in detail) was subjected to cracking using two forms of the catalyst, one a regenerated aluminosilicate catalyst, the other the catalyst modified with alumophenylsiloxane. The modifier was applied to the catalyst in acetone solution in quantities of 0.5, 1.0 and 2.0 mass %; the acetone was removed by vacuum and the modified catalyst was heated to 450°C for 2 hr in helium, followed by heating at 600° for 2 hr. Yield of coke after the cracking was determined by the ascarite method. Results of cracking are tabulated. Processing of results used equations of the kinetics involved; kinetic constants were calculated. The modified catalyst increased the yield of benzene by 1.5-4.0% with 0.5 mass % alumophenylsiloxane modification; with 1.0 mass %, it increased from 32.5 to 39.5%; with 2.0 mass % it increased by 9.5%. It is believed that the modifier adds a certain number of active centers onto the catalyst surface and might have potential for directed change in activity and selectivity of solid catalysts. Reference 1 (Russian--Kolesnikov, 1974).

[24-8586]

CSO: 1841

INVESTIGATION OF FRACTIONS OF SAMGORY CRUDE DESTINED FOR CATALYTIC REFORMING AND CRACKING

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian No 1 1979
pp 97-99 manuscript received 6 Apr 79

TOPURIDZE, O. F., KHITIRI, G. Sh. and MELIKADZE, L. D., Institute of Physical and Inorganic Chemistry, Georgian SSR Academy of Sciences

[Abstract] Considering that the gasoline fractions of Samgory crude display low octane numbers and a low susceptibility to tetraethyl lead, it was of interest to investigate their suitability for catalytic reforming with the object of converting them to high-octane fuel. To this end, the hydrocarbon composition of these fractions was investigated. In particular, the content of normal-structure in catalytically reformed methane hydrocarbons was determined by adsorption on molecular sieves. The adsorptional separation was conducted on synthetic zeolite Ca A in the vapor phase at 250°C. Desorption of n-paraffins was carried out at 350°C by means of steam. Every individual catalytically reformed fraction was separated into two fractions by passage through molecular sieves. The unadsorbed first fraction consisted of aromatic, naphthene, and methane hydrocarbons of ramified structure; the second, adsorbed fraction consisted of normal-structure methane hydrocarbons. The refractive indexes and aniline points were determined and tabulated. It was found that the content of normal-structure hydrocarbons in the catalytically reformed fractions was fairly high, 20-30%, and that their content of naphthene hydrocarbons also was 20-30%. Considering that the principal catalytic-reforming reactions are the dehydrogenation of naphthene hydrocarbons and the dehydrocyclization and isomerization of paraffin hydrocarbons of normal structure, it can be expected that these fractions can yield high-octane gasoline, especially since their low sulfur content precludes the need for desulfurization. Moreover, normal-structure paraffin hydrocarbons are currently becoming important as a processable raw material. All this can be accomplished on the basis of subjecting the 350-500°C fraction of Samgory crude to catalytic reforming.

[21-1386]

CSO: 1841

USSR

UDC 615.31:547.785.5

SYNTHESIS AND PHARMACOLOGICAL PROPERTIES OF CERTAIN DISUBSTITUTED
IMIDAZO[1,2-a]BENZIMIDAZOLES

Moscow KHMIIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 8 1979 pp 57-62
manuscript received 13 Dec 78

KOVALEV, G. V., ANISIMOVA, V. A., SIMONOV, A. M., GOFMAN, S. M., PETROV,
V. I., TYURENKOV, I. N. and FOMIN, Yu. K., Scientific Research Institute
of Physical and Organic Chemistry under Rostov University; Volgograd
Medical Institute

[Abstract] New derivatives of 9-diethylaminoethylimidazo-[1,2-a]benzimidazole which in position 2 have such radicals as n-bromophenyl, α -naphthyl, tert-butyl, and n-methoxyphenyl, were synthesized with the object of developing more effective hypotensive drugs. It was found that the hypotensive effect and its duration are enhanced when the diethylaminoethyl radical is introduced into position 9 in these derivatives and when such radicals as α -naphthyl, phenyl, and tert-butyl are introduced into position 2. Some of the resulting derivatives produced a greater hypotensive effect than the conventional hypotensive preparation RU-13 (dihydrochloride of 9-diethylaminoethyl-2-phenylimidazo[1,2-a]benzimidazole) and were only one-third to one-fourth as toxic, while in others the hypotensive effect combined with sedative and antipyretic properties.
References 8: all Russian.

[48-1386]

CSO: 1841

USSR

UDC 615.277.3:547.789.6

9-OXO-6,7,8,9-TETRAHYDROPYRIMIDO(4,5-b)(1,4)BENZTHIAZINES AND THEIR
ANTIFOLIC, CYTOTOXIC, AND CYTOSTATIC ACTIVITY

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 8, 1979 pp 51-57
manuscript received 30 Jan 79

NEMERYUK, M. P., MUSHNIKOVA, O. L., PYKHOVA, M. V., KEMEROV, A. F.,
RYABOKON', N. A., YERSHOVA, Yu. A., SOKOLOVA, A. S., CHERNOV, V. A.
and SAFONOVA, T. S., All-Union Scientific Research Chemico-Pharmaceutical
Institute imeni S. Ordzhonikidze

[Abstract] By reacting 5-amino-6-mercaptopyrimidines with 2-bromodimedone
and 2-bromodihydroresorcinol the authors synthesized 9-oxo-6,7,8,9-tetra-
hydropyrimido(5,5-b)(1,4)benzthiazines. Certain chemical properties
of these compounds are investigated. Most of these newly synthesized
benzthiazines produce an inhibiting effect on dihydrofolatereductase.
They also produce a cytostatic and cytotoxic effect, and certain deri-
vatives of this series of compounds display an in vivo antitumoral
activity, as revealed in experiments on rats, without, however, being
superior in that respect to the previously investigated 6-oxopyrimido
(4,5-b)(1,4)-thiazines. References: 3 Russian, 2 Western.

[48-1386]

USSR

UDC 615.214:547.834.4]012.1

SYNTHESIS AND PHARMACOLOGICAL INVESTIGATION OF CONDENSED HETEROCYCLIC
COMPOUNDS OF QUINUCLIDINE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 8, 1979 pp 45-51
manuscript received 16 Jan 79

BONDARENKO, V. A., KOMAROVA, N. A., ANDREYEVA, N. I., FILIPENKO, T. Ya.,
TURCHIN, K. F., MIKHLINA, Ye. Ye., MASHKOVSKIY, M. D., SHEYNKER, Yu. N.
and YAKHONTOV, L. N., Moscow, All-Union Scientific Research Chemico-
Pharmaceutical Institute imeni S. Ordzhonikidze

[Abstract] By reacting o-phenylenediamine and its C-methyl derivatives
with 2-methylene-3-oxoquinuclidine the authors synthesized 11,11a-dihydro-
10N-quinuclidino[2,3-c]1,5-benzdiazepine including its 7,8-dimethyl
derivative, reduced to 4a,5,11,11a-tetrahydro-10N-quinuclidino[2,3-c]

1,5-benzdiazepines. Pharmacological tests of the newly synthesized compounds showed them to be relatively inactive: they did not markedly affect the depressant effect of reserpine in white mice, and neither did they conteract the hyperthermic effect of phenamine and the hypothermic effect of L-DOPA and apormorphine. Only one of these newly synthesized derivatives of quinuclidine--4a,5,11,11a-tetrahydro-10N-quinuclidino [2,3-c]1,5benzdiazepine--did display elements of antidepressant activity (alleviation of the effect of reserpine, potentiation of the effect of 5-oxytryptophan). References 8: 4 Russian, 4 Western.

[48-1386]

USSR

UDC 615.281:547.722

SYNTHESIS AND BIOLOGICAL ACTIVITY OF DERIVATIVES OF 3-ARYLBENZOFURAN

Moscow KHMIIKO FARMATSEVTICHESKIY ZHURNAL in Russian No 8 1979 pp 39-45
manuscript received 20 Feb 79

GRINEV, A. N., ZOTOVA, S. A., MIKHAYLOVA, I. N., STOLYARCHUK, A. A., STEPANYUK, G. I., MATSAK, V. V., SIZOVA, T. N. and PERSHIN, G. N., Moscow, All-Union Scientific Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze; vinnitsa Medical Institute imeni N. I. Pirogov

[Abstract] As part of a continuing investigation, the synthesis of various functional derivatives of 3-arylbenzofuran was carried out. Thirty-nine different derivative compounds were synthesized, and then tested in experiments on rats and mice. Of the compounds investigated, XXI (phenylvarbamate of 2-oxymethyl-3-phenyl-5-bromobenzofuran) was found to be nontoxic, while compounds XX (phenylcarbamate of 2-oxymethyl-3-phenyl-5-chlorobenzofuran), XXI, and XXVII (thiosemicarbazone of 2-formyl-3-phenyl-5-bromobenzofuran) produced an anti-arrhythmic effect on aconitine-injected rabbits. Some of the investigated compounds also displayed a fungistatic and bacteriostatic effect, in the latter case particularly when the chlorine atom was replaced with the bromine atom. References 7: 6 Russian, 1 Western.

[48-1386]

CSO: 1841

SYNTHESIS AND BIOLOGICAL ACTIVITY OF N-o-CARBOXYPHENYLAMIDES OF THE
/3-N¹-ARENESULFOHYDRAZIDE OF OXALIC ACID

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 8 1979 pp 36-39
manuscript received 23 Jan 79

BEZUGLYY, P. A., CHERNYKH, V. P., DROGOVOZ, S. M., BEREZNYAKOVA, A. I.,
MAKURINA, V. I. and VORONINA, L. N., Khar'kov Pharmaceutical Institute

[Abstract] The synthesis and biological activity of o-carboxyphenylamides of the arenesulfohydrazide of oxalic acid (I) are described. (I) are synthesized by reacting arenesulfochlorides with the hydrazide of o-carboxy-oxanilic acid on using a 10% caustic soda solution as the HCl acceptor. The newly synthesized varieties of (I) represent preparations with a combined hypoglycemic and diuretic effect. Experiments on male white rats demonstrate that some of the (I) compounds surpass 33-62% in activity the conventional diuretic hypothiazide, while experiments on rabbits and white mice show that the hypoglycemic effect of the investigated compounds (dose 50 mg/kg) depends on the nature of the substitute introduced into the arenesulfonyl part of the molecule, and that most of the compounds (I) display a hypoglycemic activity similar to that of butamide, with the maximum effect manifesting itself toward the 8th hour after administration. The toxicity of compounds (I) is relatively low. Thus, the o-carboxy-phenylamides of the arenesulfohydrazides of oxalic acid display a high diuretic activity along with hypoglycemic properties and a low toxicity. References 9: all Russian.

[48-1386]

USSR

UDC 615.283.921.015.42:612.015.1

THE EFFECT OF THE ANTI-COCCIN COMPOUND THIALKOXYCIDE ON THE ACTIVITY
OF SOME CHOLINESTERASES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 6 1979 pp 10-12
manuscript received 28 Nov 78

VOLONT, L. A., RUDAKOV, V. V., and NIKOL'SKAYA, Ye. B., Leningrad
Veterinary Institute

[Abstract] The compound thialkoxycide (TAC) is highly effective as a preventive measure and treatment for coccidiosis in chickens, geese, ducks, and other animals. The title study was carried out using solutions of 0.5 mg/l acetyl cholinesterase (ACE) from human erythrocytes and 0.025 mg/l butyrylcholinesterase (BCE) from horse serum. Each of these solutions was mixed with a NaCl solution, a substrate solution, and a TAC solution. The activity of the cholinesterases was determined by potentiometric titration. The relative activity of the inactivated ACE or BCE was calculated as a ratio of the initial rates of hydrolysis of the substrate under the effect of the inactivated ACE or BCE and under the effect of the control solution. A calculation of the inhibition constants-- $(0.29 \pm 0.06) \times 10^{-4}$ for ACE and $(1.24 \pm 0.003) \times 10^{-4}$ for BCE--indicates that ACE is more strongly inhibited by TAC than is BCE. References 7: 4 Russian, 3 Western.

[02]

USSR

UDC 615.214.32(048.8)

NEW PSYCHOLOGICAL DRUGS (REVIEW). I. ANTI-DEPRESSANTS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 6, 1970 pp 19-29
manuscript received 24 Nov 78

MASHKOVSKIY, M. D., POLEZHAYEVA, A. I., and ANDREYEVA, N. I., All-Union
Scientific Studies Chemical Pharmaceutical Institute imeni S. Ordzhonikidze,
Moscow

[Abstract] A brief description is given of 40 drugs widely used to treat depression. Most of these are improved modifications of previously known compounds. One of the principle drugs is imipramin and related

compounds, having different substituents on the N atom. Other combinations of rings--saturated, unsaturated, and/or heterocyclic; 5- and 6-membered; condensed or non-condensed--have anti-depressant activity. The physiological behavior of many of these compounds stems from the inhibition of monoaminoxidase. A structure and brief description is given for each of the compounds considered. References 56: 5 Russian, 51 Western

[02]

USSR

UDC 615.849.1.015.25:547.653

SYNTHESIS AND RADIATION-SENSITIVITY OF S-SUBSTITUTED MERCAPTOETHYLAMINO-METHYLNAPHTHALENES AND BENZO-2,1,3-THIADIAZOLS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 6 1979 pp 33-41
manuscript received 7 Oct 78

SLAVACHEVSKAYA, N. M., TSEPOVA, N. S., STREL'NIKOV, Yu. Ye., and KIROVA, S. M., Leningrad

[Abstract] The synthesis of the benzo-2,1,3-thiadiazols was carried out. Fifteen compounds were prepared with various alkyl groups. Of the 15 thiadiazols, 10 showed an increased resistance to degradation by radiation. The activity of irradiated and non-treated materials was tested using mice. The substitution of a hydrogen atom for the amino group at the β -mercaptoethylamine and its substituted methylbenzo-2,1,3-thiadiazol radical did not reduce the radiation resistance as is observed, for example, in the cyclohexylalkyl derivatives. The substituted naphthalenes showed no evidence of radiation protection. Detailed syntheses and structural configurations are given. References 8: 7 Russian, 1 Western.

[02]

CSO: 1841

EVALUATION OF HERBICIDES ON FIELDS OF FRUIT-BEARING DOG ROSE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 6 1979 pp 76-80
manuscript received 3 Jan 79

STRELETS, V. D., BUKINA, N. V., and KOCHETKOV, V. P., All-Union Scientific
Studies Institute of Medicinal Plants, Moscow Brnach

[Abstract] Simazin destroys the majority of annual weeds; in addition, no residue was observed in the dog rose the first year after its application. However, it does have some drawbacks. Thus, a three-year experiment was undertaken of the compounds linuron, kotonan, and karagard. Suites of 6 test plots (3m x 3m) and 2 controls, were set up and evaluated for three for the following parameters: the number and mass of weeds present; the number and length of shoots and the total growth of each dog rose plant; influence of the various herbicides of the winter survivability and density of shoots of the dog rose bushes; and the average fruit weight, its % pulp, % seed, and ascorbic acid content. No consistent trends were observed to indicate a ranking in the quality of the herbicide; however, they were all non-toxic to the dog rose, did not effect the quantity or quality of the fruit, and did not leave a measurable residue. References 3: Russian

[02]

CSO: 1841

USSR

UDC 534.8

INVESTIGATION OF ACOUSTIC AND RHEOLOGICAL PROPERTIES OF ED-16 EPOXY RESIN

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSSR, SERIYA FIZIKO-TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 5 1979 pp 22-25 manuscript received 28 Mar 79

BERDYEV, A. A., ATAYEV, G., and KHEMRAYEV, B., Physicotechnical Institute, Turkmen Academy of Sciences

[Abstract] ED-16 resin, which has a molecular weight of 486 kg/kmole, epoxy number $x_e = 17.77\%$ and refraction index $n_D^{20} = 1.5800-1.5810$, is one of the epoxy resins whose rheological parameters (density and shearing viscosity) change with change in epoxy number. Its acoustic and rheological properties were studied to gain information about relaxation processes in highly viscous fluids used in industry. Measurements were taken of the coefficient of extinction of sonic energy, rate of propagation of longitudinal and transverse sound at temperatures of 10 to 90°C. Maximum moduli of elasticity K_{∞} , K_0 and G_{∞} were determined as a function of temperature. Dispersion was found in ED-16 of rate of propagation of ultrasonic longitudinal and transverse waves that shows that this epoxy resin has a mechanism in common with many strongly viscous fluids, that is the basis of relaxation behavior of ED-16. A refined nonlocal diffusion theory expounded in 1966 is discussed. 3 figures; 2 Russian references.

[56-10,657]

USSR

UDC 677.494.745.32-96.021.12:541.183.12

ANION-EXCHANGE POLYACRYLONITRIL FIBERS WITH A POLYDIETHYLAMINOETHYLMETHACRYLATE GRAFT

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5 1975 pp 13-14 manuscript received 9 Nov 78

LYSENKO, A. A., YEFIMOVA, N. A., YEMETS, L. V. and VOL'F, L. A.

[Abstract] An ion exchange material which simultaneously contains weak and strong basic groups was prepared by the title grafting, followed by alkylation of the graft chains with epichlorhydrin or methyl iodide.

The reversible redox system titanium peroxide complex, polyacrylonitrile- Fe^{3+} -hydrazine was used to accomplish the graft copolymerization. Decrease in iron content decreased the oxidative destruction of the graft copolymers and prevented formation of appreciable amounts of the homopolymer. Conditions of the reaction are presented. The fiber is an efficient adsorbent of variable valence metallic ions, viz., Cu and Ni. Figures 3; references 2 (Russian).

[51-8586]

USSR

UDC 677.4.014/017+677.4.004.14:678.067

FEATURES OF THE ACTION OF COMPONENTS OF THERMALLY REACTIVE BINDERS ON REINFORCING CHEMICAL FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5 1975 pp 28-30 manuscript received 15 Aug 78

PEREPELKIN, K. Ye., ANDREYEV, A. A., ZARIN, A. V. and KUDRYAVTSEV, G. I.

[Abstract] The reinforcing chemical fibers tested were highly-stable, industrial fibers, viz., polyesters (PE), polyvinyl alcohols (PV), hydrated celluloses (HC), polyamides and polyheteroarylenes (PHA) and glass fibers (GF) (the latter for the sake of comparison). Epoxide binders were used to prepare compositional polymeric materials with the fibers. The volumetric reaction of the binders and the fiber properties are decreased in the order HC, PV, PE, PHA and GF. The chemical fibers vary in the degree of access by the binder; the type of binder should be selected to assure minimum plasticizing action on the fibers. Figures 4; references 21 (Russian).

[51-8586]

CSO: 1841

SYNTHESIS OF POLYETHYLENETEREPIHTHALATE WITHOUT ADDITION OF CATALYSTS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5 1975 pp 10-12 manuscript received 30 Aug 78

MIKHAYLOV, G. D., SHEVCHENKO, V. V., POLYAKOV, L. V. and CHEGOLYA, A. S.

[Abstract] It is noted that the use of Sb_2O_3 , GeO_2 and other metallic catalysts in the industrial production of polyethyleneterephthalate (PETP) has the disadvantages of discoloration of the product and decrease in viscosity of the polymer melt during handling. A trial synthesis of PETP was studied using ethylene glycol ester of terephthalic acid (TPA) and the corresponding fore-polymers (I and II) which does not use catalysts, in contrast to the use of the dimethylterephthalate stage of transesterification which requires catalysis. Conditions of the polycondensation are given. The basic premise of foregoing the addition of catalysts is the positive influence on the rate of the polycondensation of addition of reactive, bifunctional compounds. Such compounds (TPA and its diphenyl or dinaphthyl esters) react more rapidly with the carbo-2-hydroxyethoxy groups of PETP than the latter do with each other, and they combine to form ethylene glycol. Reaction rates are equate. Figures 3; references 10: 3 Russian, 1 DDR patent, 6 Western.

[51-8586]

WET FORMATION PRODUCTION OF FTORLON, A TUBULAR FIBER

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5 1975 pp 15-16 manuscript received 10 Nov 78

KOSTROV, Yu. A., IGNATENKO, T. I., BUDNITSKIY, G. A., VELIKANOVA, I. M. and VOLKOVA, V. G.

[Abstract] Ftorlon is an acetone-soluble copolymer used to prepare tubular chemical-resistant fibers by wet formation and subsequent stretching. The tubular fiber is formed in a water-acetone precipitation bath from a 20-22% acetone solution of the copolymer. The desired properties of the fibers are dictated by their ultimate usage, e. g., for gas and liquid microfiltration, or absorption of a gas through the fiber wall. The

properties are a function of the conditions employed in the wet formation and stretching. Formation conditions examined included acetone content and temperature of the precipitation bath, which have a critical effect on pore size and porosity. Stretching of the fiber in air at 20° or in glycerine at 130°C affects its air permeability, and porosity, which is graphically portrayed. Variations in conditions of manufacture are able to tailor make the desired fiber. Figures 2; references 4: 2 Russian, 2 Western.

[51-8586]

CSO: 1841

USSR

UDC 678.742.23.02:66-73

SAFETY OF LARGE PLANTS FOR THE PRODUCTION OF HIGH-PRESSURE POLYETHYLENE

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 24 No 4, 1979 pp 347-352

POLYAKOV, Z. N., Candidate in Technical Sciences and General Director of the Okhtinskiy "Plastpolimer" NPO [Scientific Production Association]

[Abstract] The production of high-pressure polyethylene involves a high degree of danger, caused by the features of the technology and the equipment used for the process. The most significant factors of the potential danger of this production process are discussed, along with technical solutions employed in the foreign and domestic industry for ensuring production safety. The two stages in the production of high-pressure polyethylene are quite different in the technology and equipment used; aspects of safety are discussed in terms of these two stages. At the first stage the polymer is synthesized, in which the polyethylene granulate--the raw material--is produced from ethylene; the second stage is the makeup stage, where the raw material is treated chemically and mechanically to produce commodity products. A description is given of the general synthesis process used worldwide and of the equipment employed. One difficult technical problem is release of heat of about 800 kcal/kg in the polymerization of ethylene. The two types of reactors currently used are described, i.e., the "ideal displacement" tubular reactors, in the form of a row of series-connected high-pressure tubes supplied with jackets through which the heat transfer agent circulates, and the "ideal mixing" autoclave reactors, in the form of cylindrical high-pressure vessels furnished with high-speed mixers. In equipment of the latter type there is practically no removal of heat through the wall of the shell, but all the reactor's heat is drawn off just because of heating of the reaction mixture from the initial to the maximum reaction temperature. These reactors require a pressure

of 250 to 300 kg/cm² less than that of tubular reactors. The makeup stage of the production process includes the operations of receiving and analyzing the granulate, blending individual batches with different types of mixers, obtaining polyethylene compositions with different functional additives, transporting the granulate between different production sections, and storing, packing and shipping the finished products. Key sources of potential danger in all these operations in both stages of production are delineated. Discussed individually are compressor units, polymerizing units and makeup units. Compressor units are considered the most dangerous sections of the production process, for the equipment and gas duct systems are subjected to both high pressure and vibration. The main reasons for emergency situations are vibrational loads, resulting in such phenomena as fatigue failure of the metal, especially at points of stress concentration, seal failure in partable joints and the failure of supporting structures for equipment and pipelines. The medium-pressure (100 to 400 kg/cm²) gas lines are the most dangerous, since accidents occur suddenly in them, whereas in high-pressure gas lines they are usually preceded by leaks which can be detected. Fluctuations in pressure, the cause of the trouble, are reduced by eliminating resonant vibrations by the selection of optimal dimensions for elements of gas line systems and by the installation of buffer tanks in the direct vicinity of sources of vibration, as well as by the proper selection of the hydrodynamic characteristics of compressor valves and the contours of gas ducts. Threaded connections are a major problem, and to solve this the ends of pipes are secured with special sleeve fittings and it has been suggested that soldered or permanent welded joints be used instead of threaded. The need for the proper design of gas line systems is stressed. Methods of protecting compressors from overloads and breakdowns are detailed. It is suggested that many safety problems can be solved by removing compressors to open areas. Isolated protected servicing areas with remote controls are recommended. Fireproof clothing is recommended for personnel. The problem of the safety of compressor units can best be solved by replacing piston compressors with centrifugal. These compressors are being produced by certain foreign firms, but it is not known when they will be put into industrial service. The hazardous nature of polymerizing units is due to the fact that the reactor and high-pressure separator are subject simultaneously to internal pressure and elevated temperature. Tubular reactors incur the additional problem of intensified fluctuations in pressure. In addition, polymerization is carried out at temperatures close to the thermal breakdown region for ethylene, which involves considerable release of heat. Overheating of the reaction mixture is highly possible in the case of malfunctioning of equipment or deviations from normal conditions. Improvements in equipment design are required. Studies on the proper distribution of stresses in equipment are needed. Heat strains must be compensated. Measures are required to limit the possible hazardous effects of accidental discharge. Safety problems involving makeup units are associated with the presence in the melt to be granulated and processed of residual ethylene and with the presence of

polyethylene dust, the latter of which is highly explosive. This dust collects on the walls of ducts in the process of pneumatic conveyance of granules. Sparks and electrostatic charges can result in an explosion. Different methods of evacuating the dust are used, including vacuuming and using water vapor. Air blasting can be utilized, but at great expense. The problem of dust formation remains basically unsolved, and protective measures have been limited chiefly to grounding equipment and ducts to protect from static electricity, and sometimes to humidifying the transporting air. The safety of makeup units can best be improved by improving the technology. One method suggested is to employ inert gases for pneumatic conveyance of the material, or air from which the oxygen has been removed. References 15: 4 Russian, 11 Western.

[39]

USSR

UDC [677.494.675:536.495].061.43.017.4

INFLUENCE OF THE LINEAR DENSITY OF INDIVIDUAL THREADS ON THE FATIGUE STRENGTH OF CORD

Moscow KHMICHESKIYE VOLOKNA in Russian No 4, 1979 pp 38-39 manuscript received 2 Aug 78

SHEVLYAKOV, L. P., LOVA, V. G., SERKOV, A. T., and YELCHINA, N. V.

[Abstract] A study was carried out to determine the properties of composite cords and threads to the linear stability of individual threads made of aromatic polyamides. Such material is used for reinforcing tires and industrial rubber. Parameters measured included linear density, rupture pressure, rupture elongation modulus of elasticity at 1% elongation, and relative rupture loading. The obtained data indicate a significant improvement in the fatigue life of cord threads for a decrease in the linear density of the individual threads. For example, a fourfold decrease in the linear density results in a fortyfold increase in the useful working life of the rubberized cord. Specific linear densities can also be recommended for the different types of applications of the rubberized cords. References 12: 10 Russian, 2 Western

[09]

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USSR

UDC 677.4-96.02:0.12+677.4-96.017

PREPARATION, PROPERTIES AND USES OF FIBERS HAVING ENZYMATIC ACTIVITY
(REVIEW)

Moscow KHIMICHESKIYE VOLOKNA in Russian No 4, 1979 pp 3-8 manuscript
received 9 Oct 78

VOL'F, L. A., SHAMOLINA, I. I., and KHOKHLOVA, V. A.

[Abstract] Immobilization of enzymes on solid surfaces leads to a significant increase in their stability. At the present time, there are three basic methods of preparing such enzyme-containing fibers: 1, introduction of the enzymes into the spinning solution, with their subsequent molding into the fibers; 2, the filling of hollow fibers with enzymes; 3, the attachment of the enzymes to the fibers with covalent chemical bonds. Factors influencing the preservation of enzymatic activity include pH, temperature, the quantity and distribution of the enzyme in the polymer molecule, and the nature of the polymer molecule itself. Various studies using trypsin are presented as examples. Such fibers containing immobilized enzymes can be sterilized using a 1-5 mrad dose of γ -radiation. The enzymes on the fiber are more useful than the dissolved solutions in that the fibers can be easily removed from the reaction mixture and they retain their reactivity longer. References 17: 13 Russian, 4 Western

[09]

USSR

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OPTIMIZATION OF THE DEHYDROGENATION OF ETHYLBENZENE INTO STYRENE IN THE
PRESENCE OF AIR OXYGEN

Baku AZERBAIDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, 1979 pp 13-17

ABILOV, A. G., ALIYAROV, R. I., ALIYEV, V. S., TER-SARKISOV, B. G. and
KHIDYROV, B. S., Institute of Petrochemical Processes

[Abstract] The dehydrogenation of ethylbenzene into styrene in the presence of atmospheric oxygen results in continuous recovery of the catalyst and intensifies the supply of heat for the endothermic reaction of dehydrogenation, thus markedly increasing the yield of styrene. Moreover the introduction of atmospheric oxygen into the batch assures

a relatively isothermal mode of the process. In this connection, formulas for optimizing this process by deriving the optimal factors (temperature of the reaction zone and the amount of charge in the adiabatic reactor), based on an investigation of the process kinetics, and including equations of kinetics and material balance, are presented. Allowance is made for technical-economic factors such as volume of output, price of product, production cost, and the cost of raw materials and overhead. It is established that the minimum production cost is reached when the annual output of styrene is 50,600 tons. References 7: all Russian.

[43-1386]

USSR

UDC 678.643.22:678.049

MODIFICATION OF EPOXY RESINS WITH UNSATURATED OXYESTERS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 80-82

LYUBOV, G. M., MAMEDOVA, G. G., ABSULLAYEVA, L. S. and MAMEDOVA, L. G.,
Azerbaijani Polytechnic Institute imeni Ch. Il'brym

[Abstract] The unsaturated oxyesters 1-benzoato-3-allyloxypropanol-2 (I) and 1-phenylaceto-3-allyloxypropanol-2 (II), synthesized by condensing 1-chloro-3-allyloxypropanol-2 with salts of aromatic carboxylic acids, were tested for suitability as modifiers-diluents of ED-20 industrial epoxy resin. Their addition in proportions of 10-30% to ED-20 resin treated with PEPA (polyethylenepolyamine) hardener, resulted in the formation of epoxy compounds with improved and stable physico-mechanical properties, particularly as regards elasticity, high-temperature strength, and thermal deformation. The dielectric loss angle of the resulting compounds satisfies the technical requirements. Reference 1: Russian.

[43-1386]

CSO: 1841

DIEPOXYDIHYDRODICYCLOPENTADIENYL ESTERS OF NAPHTHENIC ACIDS AS PLASTICIZERS OF POLYVINYL CHLORIDE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 67-79

ZEYNALOV, B..K., DADASHEVA, T. G., SULEYMANOVA, Z. G., ISKENDEROVA, S. A. and ALESKEROVA, O. M., Institute of Petrochemical Processes imeni Yu. G. Mamedaliyev, Azerb. SSR Academy of Sciences

[Abstract] Diepoxydihydrodicyclopentadienyl esters of naphthenic acids were synthesized by epoxydizing dihydrodicyclopentadienyl esters of naphthenic acids by means of peracetic acid, with the molar ratio between reactants being 1:2. The thus synthesized esters are high-b.p. oily yellowish fluids, odorless, insoluble in water, but soluble in organic solvents. The plasticizing properties of the thus synthesized esters cyclohexene and methylcyclohexene of naphthenic acids were tested on S-65 polyvinyl chloride (PVC) suspension. The test specimens had the composition (in parts by weight): PVC, 100; plasticizer, 40; calcium stearate, 1.0. The resulting compositions were carefully mixed and gelatinized at 70°C for 2 hr, and thereupon rolled at 140°C for 5-7 min. The thus obtained films were pressed at the same temperature and pressure, 150 kg/cm². Tests of these specimens showed their physical and strength properties to be superior to those of the PVC plastics based on using dioctylphthalate as the plasticizing agent. Figures 3: all Russian.

[43-1386]

CSO: 1841

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PRODUCTION OF EM-3 RESIN AND ITS USE IN AUTOMOBILE TIRE PRODUCTION AND RUBBER INDUSTRY ARTICLES

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, 1979 signed to press 22 Aug 79 pp 14-15

ZYKOVA, N. P., Senior Scientific Associate, ZAKHAROVA, T. V., Junior Scientific Associate, PARSHUKOV, A. A., Senior Engineer and POLUYKO, Ye. G., head of the Laboratory of the Central Scientific Research and Planning Institute of Wood Chemistry Industry.

[Abstract] The Central Scientific Research and Planning Institute of Wood Chemistry Industry (TsNKhI) has developed a technology for producing a new product (modified extraction resin) EM-3 with improved operational properties which can be substituted for wax resins in tire production in recipes by which 30-40% of this output is produced. Series production began in 1977 and automation of the process required granulated resin. Technology of production of granulated resin is described and the block diagram of this is presented. This process is recommended for industrial production. The use of this technological process provides savings of 1 million rubles per year in the Wood Chemistry Industry and with the use of granulated resin EM-3 this figure should increase. Figures: 2.

[23-2791]

UDC 678.4.065.001.2

PRESENT STATE AND PROSPECTS OF DEVELOPMENT OF TIRE PRODUCTION OPERATIONS FOR TRUCKS AND BUSES

Moscow KAUCHUK I REZINA in Russian No 9 1979 signed to press 5 Sep 79 pp 3-5

PRASHCHIKIN, V. N., Scientific Research Institute of the Tire Industry

[Abstract] A brief overview of experimental design operations over the last 15 years to develop different types of automobile and truck tires was presented. The importance of development of radial type tires was emphasized. Tables present specifications for radial and diagonal tires produced by the Soviet Industry for Automobiles and Trucks. A brief description of some of the needs and problems in tire production for the near future was presented.

[28-2791]

STUDY OF THE RELATIONSHIP BETWEEN MUNI (M) VISCOSITY AND PLASTICITY OF ISOPRENE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 9 1979 submitted 3 Mar 77 signed to press 5 Sep 79 pp 6-7

SAFRONOVA, G. S., ZHAKOVA, V. G., KARMIN, B. K. and KOVALEV, N. F.,
Scientific Research Institute of the Tire Industry

[Abstract] The relationship between Muni viscosity (M) and plasticity of synthetic isoprene rubber (SKI), lithium-isoprene rubber (SKI-3) and natural rubber (ND) was depicted by a family of curves proceeding from a point with coordinates $M = 0$, $Pl = 1$ and tending toward values $M = M_i$. Numerical differences of parameters M (Pl) and M ([h]) of the rubbers studied were found to be caused by their different cohesive strengths which depends on the molecular structure of the polymer chains and, with an increase of M_0 and M_{max} the rubbers fall into the sequence $NK > SKI-3 > SKIL$ and are found in the same sequence upon increase of intensity of breakdown during vulcanization. Quality control procedures for determination of the M, Pl relationship require determination of the values of M and Pl in the interval required. References: 8; Figures: 2.

[28-2791]

EFFECT OF PARAMETERS OF EXTRUSION ON ANISOTROPY OF PROPERTIES OF A BLOCK COPOLYMER OF BUTADIENE AND STYRENE

Moscow KAUCHUK I REZINA in Russian No 9 1979 submitted 2 Jan 79 signed to press 5 Sep 79 pp 19-22

IL'YAKOV, Ye. V., KULEZNEV, V. N., KRIVONOSOV, A. I. and ZOTKINA, I. V.,
All-Union Scientific Research Institute of Medical Polymers

[Abstract] Investigation of the change of anisotropy of properties of a block polymer of butadiene and styrene (DST-30) was determined by studying the effect of the rate of shift of the forming gap, the degree of drawing of the melt, the temperature of extrusion and the yield index of the melt on the degree of orientation and anisotropy of properties of the

block polymer, showed that structural orientation of DST-30 occurred under shear stress on the melt without tension loading. Tension caused a simultaneous increase in the melt of both molecular and structural orientation, while an increase of extrusion temperature and the yield index of the melt reduces both the structural and molecular orientation in it. It was proposed that anisotropy of properties of DST-30 extruded articles may be reduced by reducing the degree of drawing of the melt and increasing the fusion temperature. These methods were used to produce blood transfusion equipment with the capacity for self-sealing of punctures. References: 12; Figures: 3.

[28-2791]

USSR

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INVESTIGATION OF THE SELENIUM-SULFUR VULCANIZATION OF BUTYL RUBBER

Baku AZERBAIDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4 1979 pp 70-73

AKHMEDOV, G. G., SADYGOVE, Sh. F., MAMEDOV, M. M. and BABAYEV, R. Kh.,
Institute of Chloroorganic Syntheses, Azerb. SSR Academy of Sciences

[Abstract] The combined use of selenium and sulfur as vulcanizing agents with respect to butyl rubber was experimentally investigated. To this end, batches containing a fixed amount of selenium (1.0 part by weight) and a variable amount of sulfur (0.5 to 2.0 parts by weight) were vulcanized at 110 and 143°C for 10-80 min. It is established that in the process of the vulcanization of butyl rubber most of the selenium is consumed within the first 30 min, with the remainder being consumed in vulcanization process as functions of temperature is presented. The consumption of selenium was found to increase with increase in the proportion of sulfur in the batch; then also the degree of vulcanization, elasticity, and stress-rupture strength of the rubber correspondingly increased. Figure 1; references 6: all Russian.

[43-1386]

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- END -

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WHY CHIMKENT CHEMICAL INDUSTRY WORKERS ARE BEHIND SCHEDULE

Alma Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 9, 1979, signed to press 3 Sep 79, pp 20-27

/Article by A. Petel', Special Correspondent, Alma-Ata-Chimkent-Dzhambul-Karatau/

/Text/ The phosphorus industry is far from the least important industry in the industrial development of the country. High-capacity phosphorus producing plants were erected within a comparatively short time in southern Kazakhstan. However, they all are very far behind schedule in fulfilling their plan tasks and the rate of increase of production of the basic product (yellow phosphorus) is very, very low.

The unsatisfactory operation of the Chimkent production association "Fosfor" causes special concern. As you may know, this enterprise, quite recently, was highly progressive and was awarded the challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the VTsSPS /All-Union Central Trade Union Council/ and Central Committee of the VLKSM /All-Union Lenin Young Communist League/ for the results of the All-Union Socialist Competition for 1976.

What is the cause of disruption of the production rhythm of the Chimkent chemical industry workers? In our opinion, the answer to this question presented in this article will partially explain the problem and suggest reserves for growth not only for this association but for the subsector as a whole.

The Very Beginning

Managers of the "Fosfor" association explain the failure to fulfill the plan tasks and to perform the socialist obligations, first, by the low quality of the phosphate material obtained from the "Karatau" industrial union.

They declared that the high content of different admixtures in the ore, impairs the technological process for yellow phosphorus production.

These arguments are confirmed by examples.

Since April of this year, the first production of yellow phosphorus, where the RKZ-48f [Charging Control Relay] furnace was installed, began to process Dzhannatas phosphorites instead of the Aksayskiy ores used previously. Examination of the "behavior" of the new raw material in ore heat treatment furnaces (the study lasted for 1 month and was performed by associates of the central laboratory of the association and KazNII Gimpofosfor [Kazakh Scientific Research Institute of the State Planning Institute of Phosphorus Production]) produced unfavorable results. Thus, an insignificant increase of the coefficient of operating time of the ovens was accompanied by a reduction of their average hourly productivity in comparison with the production from Aksayskiy phosphorites by approximately 1/ percent. The amount of slag produced also increased noticeably.

Science explains this by the high level of harmful lithological varieties in the Dzhannatas raw material. How did the Chirchik chemical industry workers approach the solution of this problem?

A.S. Atiyatunov, head of the phosphorus production sector of the central laboratory of the association says:

"Today there are practically no scientifically substantiated requirements for phosphorites to be used in electrothermic processing. All existing standardization documents, which determine the quality of phosphate raw material, consider only the stability of chemical composition, that is, the level of phosphorus anhydride and the insoluble residue and also the granulometric composition -- with the exception of the fines level (class -- 10 mm)."

"We think it is necessary," continues Aleksandr Saitgalievich, "to introduce into the technological requirements for raw material an entire series of new parameters which consider both the mineralogical composition and the technological properties of the ore. Experience accumulated justifies the following requirements for phosphorites: the content of phosphate varieties should be at least 90-92 percent and all forms of shales should not exceed 4 percent and the level of other varieties should not exceed 4 percent. With all of this, the concentration of phosphorus anhydride should constitute at least 23.5 percent and the level of insoluble residue should not exceed 20 percent."

A.S. Aflyatunov presents an example in support of his opinions. From November 1978 to February 1979, Chimkent workers received ore, for second production, of precisely such a composition. In this period, the highest productivity was obtained from the RKZ-72i furnaces.

At first glance all of this sounds quite convincing: formulate the appropriate scientifically substantiated requirements for raw material quality, give us good ore and the matter of fulfilling the plan tasks will be settled.

In other words, the Chimkent chemical industry workers propose the adaptation of the phosphate raw material to the processing technology and not the reverse, that is, the adaptation of the technology to the raw material. It does not matter greatly that such an approach to the solution of the problem conflicts with the complex use of raw material resources. (This is considered in greater detail in the article by M.A. Mukhtarov, Sh.Sh. Urgaliev, S.I. Tyutebayev and B.V. Koliyev presented in this journal).

We asked deputy director of KazNII Giprostefor for science Ye.S. Bugenov to give his opinion concerning the problem of the use of Dzhanatas phosphorites.

There is no doubt that we should use what nature gives most completely and rationally. However, today's technology of production of yellow phosphorus dictates additional requirements for the quality of phosphorites. Regrettably, research studies of the effect of lithological varieties on the technological process have been developing only most recently. A geomineralogical sector was established at KazNII Giprostefor. But what is its function? It is duplicating the functions of plant laboratories, studying the composition of ores shipped from the mines. It seems to us that scientists should be engaged in this directly at the raw material base.

An argument in favor of such an approach is the fact that the present extent of study coverage of the Karatau ore stocks does not permit substantiation of the requirements for raw material and this means it does not permit prediction of its technological properties.

F.F. Sandt, candidate of technical sciences, head of the central laboratory of the Trade Union "Karatau" says:

"Only eight of the 45 deposits of the basin have been prospected in detail. Even during this, the technological properties of ores in respect to electrothermic processing were not determined. For many of these, the appropriate semi-industrial tests for suitability for industrial production were not conducted in general. A study of the ores of the prospected

deposits involved only determination of the capacity and the spatial disposition of productive seams, a detailed determination of the percentage content of 3 or 4 basic chemical components and an amalgamated description of the structures and textures of the ores.

Naturally, this is inadequate for an evaluation of the suitability of the ores for electrothermic conversion, without even considering possible new processes for their industrial processing. Therefore any additional limitations on chemical components will require reprospecting of the already prospected deposits. This, as is well known, is expensive and time consuming. Now, it is necessary to reconstruct radically the practice of conducting detailed prospecting and perform complete determination of the chemical composition and all known distinctive properties of ores. Later this will permit inclusion of corrections in requirements for phosphate raw material and will help in the search for new promising means and methods of processing it.

Karatau Basin has moved into first place in the country in overall known and prospective supplies of phosphorus-containing ores. The ever arising problems of the raw material base deserve at least a doubling of the scientific research efforts devoted to them.

In finishing our conversation concerning the quality of the raw material, we must emphasize the imperfection of the technology of delivery, storage and use of the phosphorites received at the association. Thus, there still has not been introduced a progressive method of maintaining the averageness of the ore which involves the use at gallery warehouses of a system of automatic regulation of bin averaging (SARBU). There is still no precise demarcation of warehouses for reception and storage according to forms or raw material. There still exists a possibility of mixing components in random proportions. They more frequently depend upon the bulldozer operator who places the ore in the bin than on the technology. There is no use of precise nuclear-physical methods of analysis of the ores before loading them in the bins in the furnace section. All of this reduces the operational efficiency of control of the technological process in the electrothermic furnaces.

However, the main issue in the raw material problems was, and still remains, the absence of deep thermopreparation of the phosphorites.

What Is Best?

Science has demonstrated and practice has confirmed that the end result, the production of yellow phosphorus, depends upon the high-grade thermic preparation of the phosphate raw material. When we asked F.F. Sandt whether the existing requirements for raw material ensure its suitability for industrial production, we obtained a direct answer:

"In the absence of appropriate thermopreparation, no. Deep annealing in combination with the process of screening of fine classes (in addition to decarbonization roasting) presents its own barrier, impeding the admission into the furnace of low-strength non-refractory ores and thus narrows the variance interval of physical properties of the raw material, entering the ore heat-treatment furnace. In demanding harsher terms of technological conditions for the raw material, the Chikent workers are testifying to the fact that they have practically abandoned the link of thermic preparation."

What is the true state of affairs for this decisive section? Chief technologist of the association Yu.V. Shkarupa discusses this.

"The scheme of thermal preparation of the first production in which lump phosphorite is processed in a mixture with pellets on belt roasting machines has not justified itself. Because of wedging of the lump material, the machines frequently fall into disrepair. The decarbonization process is weak (10-30 percent). This produced increased sludge formation during phosphorus production. In our opinion, the fault lies with the entire construction of the machines, on which we cannot fire the entire layer of raw material."

The situation is more complex in the 2d production, Yuri Vasil'yevich continues. Here 3 slotted-shaft furnaces are installed. However, they have not operated at the designed regime. Furnace No.3 was renovated but once again the required firing temperature ($950-1050^{\circ}\text{C}$) was not achieved. Thus, neither the belt roasting machines nor the slotted-shaft furnaces provide suitable preparation of the raw material in all of its aspects: decarbonization, mineralogical blending, blending of the granulometric composition, dust removal, etc..

Some explanation is required here. Since the beginning of development of the domestic phosphorus industry, drawing and design organizations have been introducing new technologies of thermopreparation, and selecting the most optimal version. As a result, we observe, at one plant, two different methods of primary processing of the raw material. All of this would be logical if they were tested under industrial conditions before introduction.

Talking with the designer of the slotted-shaft furnaces, head of the heat engineering department of LenNII Giprokhim /Leningrad Scientific Research Institute for the Planning of Plants of the Basic Chemistry Industry/ M.Sh. Islamov, I asked:

"Mansur Shaikhovich, why do you consider your own creation the most applicable for the thermopreparation process?"

"Slotted-shaft furnaces are the simplest and most reliable."

"But you know they still cannot ensure high-quality thermopreparation of the raw material since they have not gone beyond the design regime."

"Renovation of furnace No.2, which is now being conducted in the association, will make possible elimination of specific deficiencies."

Renovation. Alterations. These words have become mainstays in the lexicon of the Chimkent chemical industry workers and have become pivotal during compilation of different letters and applications. Behind them are concealed miscalculations and derelictions of duty of designers, constructors and scientists. And even more -- thousands of tons of unproduced phosphorus. Take, for example, those same slotted-shaft furnaces.

The renovated furnace No.3 was in service only 2 months (March and April 1979). In the middle of May, it accidentally went out of service. Now, furnace No. 3 awaits its turn for a new renovation, while furnace No.2 is presently being renovated. Moreover, the reassembly, installation and preparation for operation of a single slotted-shaft furnace requires at least 3 months.

So, here we are still merely dreaming about high quality thermal preparation of the raw material. Existing technology does not facilitate this. It is no accident that the chief production process engineer appeals to the experience of the champion in progressive, high-temperature ore processing of Karatau phosphorites (the Novodzhambul Phosphorus Plant). He, as many others, sees the development of synthetic raw material as the answer to the heat treatment problem. However, even in 1971, the complex brigade of the Minkhimprom SSSR (Ministry of the Chemistry Industry, USSR) substantiated the advisability of deep thermal preparation by means of agglomeration or preparation of pellets. However this was not followed by practical use at operating enterprises and the head institute of LennII Gipromkhim is being occupied, as before, in experiments on slotted-shaft furnaces.

It is time for the "Soyuzfosfor" association and the Minkhimprom, USSR to listen to the opinion of the Chimkent chemical industry workers and to create a unified technological procedure with the use of synthetic raw material -- pellets. Only this version, already tested in world practice, will solve all of these cardinal problems associated with the complex use of Karatau phosphorites.

The large yield of slag must also be considered as a technological shortcoming. It now constitutes 15-20 percent. In other words, thousands of tons of yellow phosphorus are lost annually.

The association production-process engineers associate the significant increase of slag formation with the worsening of quality of the silicon-phosphate raw material. The basic cause lies elsewhere. The quantity of slag depends, first of all, on the thermal preparation of the phosphorites, the accuracy of compilation of the charge, the performance of the technological process in the furnaces, the efficiency of operation of electrofilters, in a single word, in precisely what the technologists of the association should be engaged in doing. However, a great many facts indicate that the technological discipline at the enterprise is being violated and the operational parameters for the ore thermic furnaces are not being observed. How, for example, is it possible to avoid slag formation if, of the two systems of electric filters, to our sorrow, one operates haphazardly? Or, as we already said, when the bulldozer operator and not the production process engineer decides the question of blending the raw material.

Undoubtedly, all of these shortcomings impede fulfillment of the production plan and the sale of output.

The Reliability Of Backup Organizations

Without creation of a firm, reliable backup organization, we cannot expect production successes. The resolute striving for high phosphorus production should be reinforced by well coordinated work of all backup services. However, just one such service, the mechanical repair service, has, for a long time, caused the most serious concern.

This concern is well founded. Judge for yourself: the repair base was created at the opening of the enterprise and remained at the same level and you know the cost of fixed capital since that time has increased more than 6 times. The present capacity of the repair shop provides only 25-30 percent of the overall requirements for spare parts and non-standard equipment. Deputy chief mechanic of the union I.P. Zhogalev tells about this in greater detail.

"The enterprise is equipped with unique technological equipment. It requires careful handling and daily preventive maintenance. However, our repair personnel are occupied only in the elimination of the causes of different unplanned shutdowns. The main contractor for capital repair (the Chimkent Works-and-Buildings Department Installation Administration 1 of the "Kazakhimremstroyontazh" trust) not only does not have its own

production base but does not even have its own tools. We are forced to supply it with spare parts and gear necessary for work which, obviously, cannot always be done.

Moreover, the stock of machine tools in the repair shop is inadequate. In spite of the fact that the coefficient of interchanability of equipments was brought to 1.6, repairmen could not ensure production of a minimum of spare parts. Thus, under a plan of 1.6 million rubles, a total of only 400,000 is being produced. The situation is being aggravated by the fact that a basic part of the stock of machine tools is obsolete. The shop began operations in 1964 and its equipment now is practically the same as then.

"The small repair workshops," continues Ivan Petrovich, "are basically production-process shops. The inadequacy of their equipment may be judged by the fact that they are undersupplied by nearly 100 metal lathes in new items alone."

"We are placing all of our hopes on the new South-Kazakhstan Repair Plant (YuKRZ). Regrettably, erection of it is being delayed from year to year."

Yes, the prospect of Chimkent chemical industry workers obtaining, in the very near future, a major (with sale of retail production of 18 million rubles) modern plant for repair of chemical equipment is hazy although, according to plan, it should be placed in operation in 1980. Here is why. There was a prolonged quarrel concerning the location of the future plant. And finally everything was settled and KazNIIGiprosfor began preparation of the working drawings.

The low capacity of the repair base is having an effect upon the financial affairs of the association. Each part ordered on the side becomes three or four times more expensive. Orders must be placed not only in our own oblast but also throughout all of Kazakhstan and even in neighboring republics. The suppliers sometimes completely avoid production of scarce parts.

In this plan, a helping hand may come from the new mechanical-repair plant of the Dzhambul industrial association "Khimprom."

"Yes, we are obliged to help our neighbors, the Chimkent plant," declares deputy director general of the association, M.D. Atabayev. "But, we actually have no such plant. To date, we are ready to receive equipment of a shop with an open area of 10,300 square meters. There is a shortage of more than 300 metal lathe units. Therefore, we can scarcely manage

with the present number of machines and fill orders for spare parts for Dzhambul enterprises of the chemical industry.

"A special concern," Mukhan Dzhumagaliyevich says later, "is the state of affairs at the construction of the casting shop. It should have been in operation in the past year. However, with an annual plan of construction and installation operations of 4 million rubles, the general contractor "Dzhambulkhimstroy" has mastered 10 times less. The builders have performed even worse this year."

It appears that the Chimkent chemical industry workers must wait for better times. No. There are reserves for improvement of the work of repair personnel and those in the association simply ignore them as they ignore the order of the minister of the chemical industry, issued in 1973. We are talking about intra-plant centralization of the repair service, which conducts ordinary maintenance. As practice shows, the production of shop repair men is two times and even three times less than, say, that for ChRSMU-1 workers.

Thus, it is possible to increase the capacity for production of spare parts. This will require the removal from production-process shops of 85-90 percent of the metal lathes and the installation of them in a newly constructed repair base building. According to calculations of specialists, this measure will make possible the increase of the load factor of the lathe pool, on a 2-shift operation, from 0.4 up to 0.7-0.75 and to increase the annual output volume of production of the repair shop up to 4.5 million rubles and with the introduction into operation the YuKRZ (South-Kazakhstan Repair Plant), the level of provision of spare parts to the association will reach 85-90 percent of the overall demand.

Of course, there are many difficulties on the path to centralization of the repair service for such an important enterprise, with different conditions of operation, as the "Fosfor" association. Let us return to the order of the minister on ordinary repair. Everything in it is well organized and its economic advisability is confirmed. But the well prepared document was not followed by practical work: execution and control.

Discipline Is The Solution

There is no doubt that Chimkent chemistry industry workers function under complex conditions. However, objective difficulties, which restrict the increase of basic production became, for the directors of the association, a unique screen behind which they conceal their own wastefulness, passivity and we must say directly, the indifference to the fate of the plans and socialist obligations. You know, 3 years ago the plant operated harmoniously. It was considered a progressive plant in the sector and the conditions at that time were the same as they are today.

However, there are two basic productions which manufacture yellow phosphorus and they publish different indicators under the same situations. In order to present this graphically, we shall present results of their activity for the first half of the 4th year of the Five-Year Plan.

The collective of the first production fulfilled the program for the 6 months by 100.9 percent. Labor productivity here rose by 3 percent over that for the same period of last year. The collective of the second operation fulfilled the 6 months plan by only 79.1 percent. Of course, the labor productivity assignment was wrecked.

In explaining the causes of this obvious disproportion in realization of reasonably distributed programs, we frequently heard from directors of the association, "The situation here is simple -- the first production was commemorating their 13th anniversary. Naturally, time had united them into a friendly, harmonious collective with good traditions, one of which had become the systematic fulfillment of socialist obligations. Meanwhile, the collective of the second production came into existence with the start up of the second turn of the plant, that is, in 1974."

We can scarcely agree with such an explanation. Five years is an adequate amount of time for formation and establishment of a collective. These arguments of directors, in essence, constitute the acknowledgement that the instillation in the workers of the spirit of responsibility for putting the plan in action is not being accomplished here.

In order not to be speaking without evidence, I shall present some figures and facts.

There were 2136 lost work days in the association in only the last 6 months. The lion's share of the loss was from yellow phosphorus shops, which came from the second production and which constituted 565 man-days.

Of course, any infringement of labor discipline entails unsatisfactory conducting of the technological process, disruption of the shift quota of the entire collective and, in addition to this, accidents such as that, for example, which occurred at the beginning of February in the thermal preparation shop of the second production. Here, because of the absence on the shift of only a single worker from the attending personnel of the 10th weighing station, there were significant errors in phosphorite output. As a result, two shops were shut down.

Here is another example. In June, because of the negligence of an apparatus operator of the yellow phosphorus shop of the second production, there was an oil leak in the 9th electric filter. The down time of the furnace was nearly 30 hours. All of this cost the enterprise financial loss.

Were these cases investigated by the shop committee? Were the guilty ones punished? No. Although, by the way, we know that 86 workers were dismissed as punishment for shirking their duties in the first half year alone.

So, here they are trying to improve labor discipline by extreme measures instead of active everyday educational work. It is understood that such "rigorous" actions affect the turnover of personnel: for the 6 months in the association, 1060 persons were hired and 1132 were dismissed. These figures once more indicate the necessity for a prompt change in the approach to the education of workers.

Let us return to the second production. Is it possible that the administration and the Trade-Union Committee did not investigate the matter of the lagging behind of the collective, did not assist it to recover. They are helping. There is a frequent replacement of supervisory personnel. Since the creation of the second production, there was replacement of 5 chiefs, dozens of foremen and crew leaders. Certainly, such reshuffling is no more than half a measure, which, incidentally without specific, skillful assistance only compromises the new directors of production in the eyes of the collective.

However, the association can deal with the matter seriously and skillfully direct people to the solution of important problems. Now, as we said above, installation of the renovated slotted-shaft furnace No.3 is under way. This item was announced as a shock measure and is placed under special control of the Party Committee and the board of the association. The staff is being organized. In a word, everything is being done to place the furnace in operation ahead of schedule.

The moving force, as is well known, is socialist competition. It is assisting in the discovery and the bringing into effect of intra-production reserves.

Regrettably, the organization of mass, efficient labor competition is restricted in the "Fosfor" industrial association. This is especially true of the second production. It is true there is pretense, including slogans, placards about competition. But we questioned several dozens of workers and no one clearly could explain the essence of the supposedly widely subscribed to initiative of Rostov inhabitants "Work Without Falling Behind."

Meanwhile, the experience of organization of effective labor competition is straight forward, in the first production. It is noteworthy that the instigators of the initiative of the Rostov inhabitants in the association as well as other valuable undertakings was precisely this

progressive collective. Here is set the everyday control of the course of realization of socialist obligations. This permitted a marked increase in the exactness and responsibility for observance of a definite labor rhythm and a strict fulfillment of technological regulations.

Schools of advanced experience acquired great popularity on the first production. One of these is supervised by senior apparatus operator, bearer of the Order of Labor Glory 3d degree, Vladimir Yermolayevich Lyubchenko. They told us with unconcealed pride that chemical industry workers came from Dzhambul and Tol'yatti to adopt his progressive ways and methods of labor. He taught the guests to reduce to a minimum downtimes of furnaces not provided for by the plan and to increase their productivity.

The guests are coming. They are gaining experience. This is very good. But why are V.Ye.Lunchenko's progressive ways and methods not being adopted in the lagging behind second production?

When they say "inner resources" they most often understand this to mean people. In them actually is hidden inexhaustible forces and strength. In order that these forces are used with maximal productivity with the greatest efficiency (for the glory of these very people themselves) organization is required. It, in essence, seals the fate of all plans. Regrettably, this organization is lacking in some subdivisions of the enterprise.

Do they know about the shortcomings in the operation of the Chimkent production association "Fosfor" at the USSR Ministry of the Chemical Industry and the "Soyuzfosfor" association? Of course they know. But effective, purposeful measures for improving the organizational work at the enterprise are not being undertaken. Here they are taking the easy and furthermore, harmful to the collective path -- correcting the plan assignments by reducing the indicators. Thus, in only the first half of the year, the planned volumes of production and sale of output were changed six times.

The restoration of its former glory is possible for the enterprise only if, in the near future, there is elimination of the gaps in the complex, effective use of raw material, in the technology of production of the end product and if the production capacities are developed completely and their output increased, and if the problem concerning creation of the required repair base is solved more quickly. The increase of the attention to socialist competition is of utmost significance. All of

this should pursue one goal -- the unconditional fulfillment of the plan assignments, the increase of efficiency and the quality of operation.

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TECHNICAL RE-EQUIPMENT OF NITROGEN PRODUCTION IN THE UKRAINE

Moscow EKONOMICHESKAYA GAZETA in Russian Nov 79 p 16

[Article by V. Galkin, instrument control man of the nitrogen production association and deputy of the UKSSR Supreme Soviet: "Technological Progress: Aiming at the Future"]

[Text] During the current Five-Year Plan a heavy-duty machine with a capacity of 41,000 tons of ammonia per year manufactured by Soviet mechanical engineers was put into operation in our nitrogen association. Compared to the old equipment labor productivity on it is six times higher, and the production cost is nearly two times lower. One thousand four hundred kilowatt-hours are saved in the output of a ton of ammonia.

We mastered the unique machine in one month. When I reflect on why we succeeded in squeezing through ahead of schedule, I see several reasons, mainly the high qualifications of the workers and specialists. Of course, this did not develop by itself but resulted from training the labor force at our university of technical progress. There chemists from the Northern Donets Basin acquire the trades of computer repairmen, instrument-makers, mechanics and production engineers. Departments for shift supervisors and skilled workers, instructors, efficiency experts and public accident protection inspectors are in operation. More than 1,100 persons are taught at the university annually. In addition a branch training center has been created within the association for training personnel to service large unit capacity ammonia machines at allied enterprises.

This is one of the conditions for the quantitative and qualitative growth of production in our association. In addition to the goal set, we have manufactured products worth R 5.5 million, including more than half a million tons of mineral fertilizers for agriculture, since the beginning of the Five-Year Plan. One of the main factors is technical re-equipment.

Modern, highly automated, economical, new machines have been and are being built; active shops are being renovated. The association collective is switching gradually from simple, partial improvements to the comprehensive

solution of increasingly complex technical problems of scientific-technical progress.

I do not know one plant, shop or section where such work--connected in one way or other with technical re-equipment, with the improvement of labor conditions and the sanitation of the environment--is not underway. Since the beginning of the 10th Five-Year Plan 119 major measures of scientific and technical progress have already been implemented at the enterprise.

The comprehensive approach to the solution of technical problems bears a great yield. It is precisely thanks to such an approach that two dilute nitric acid units with a capacity of 240,000 tons per year (labor productivity here is more than 47.5 percent of that of the former plant) and a complex for production of (AG) salts and adipic acid were mastered in short periods of time. The difficulties in mastering the planned capacities for large-capacity methanol and sebacic acid units have been successfully overcome.

I should like to talk specially about the latter machine. The progress in obtaining sebacic acid has no analogs either in Soviet or foreign practice. It is based on electrochemical synthesis and eliminates a scarce raw material--castor oil.

The production workers' successes rest upon a close relationship with scientific research and planning institutes. More than 100 economic contracts were concluded with them during three years of the Five-Year Plan for help in introducing progressive technology, new apparatus, catalysts and other innovations. The economic effect of the realization of these contracts is already as much as tens of millions of rubles.

The extracolumnar method of restoring the catalysts of ammonia synthesis may serve as a characteristic example of the "science-design-production" relationship. The new method was developed by scientists of the Institute of Physical Chemistry of the USSR Academy of Sciences and the State Institute of the Nitrogen Industry and Products of Organic Synthesis (GIAP). A number of investigations were conducted at the Moscow Chemico-Technical Institute imeni Mendeleyev, at the Dneprodzerzhinsk and Northern Donets Basin Nitrogen Associations. A group of scientists and engineers conducted comprehensive studies involving obtaining data for planning, creating and operating experimental industrial units.

What have the major innovations given us production workers? Previously 11 days were required for restoring the catalysts in the columns for synthesis of ammonia. And all this time both the synthesis shop and all shops interfacing with it ran idle, consuming energy. Now, however, the columns begin to produce ammonia in two days.

The automated control system [ASU] is having an increasingly clear effect on the technical growth of the enterprise. Today the ASU is solving more than 260 problems of an organizational-economic and production nature. With use of the ASU the solution of the problem of increasing product quality has been speeded up. In carrying out technical measures and also in developing the competition started by the administrator of the lactam shop, L. S. Sorochinskiy, under the motto "A certificate of product quality for each product," the collective of the association brought the number of types of products certified for the state emblem of Quality to 25 and their proportion to the total volume of production, to 47 percent.

The Northern Donets Basin chemists greeted with great satisfaction the decision of the party and the government concerning the further improvement of the economic mechanism. The measures called for will accelerate the development of new types of products and progressive technology and their rapid assimilation in production.

As for the Northern Donets Basin Nitrogen Association, great problems remain to be solved in this direction in the immediate future. The course of technical re-equipment of production is continuing. On the basis of scientific-technical progress, it is planned to increase the capacities of many plants and to master the output of new types of products before the end of the 10th Five-Year Plan and during the 11th Five-year Plan. Extensive work on environmental protection will be carried out, including the prevention of any pollution whatsoever of the Northern Donets River. The working conditions, everyday life and rest of the workers of the Northern Donets Basin will be considerably improved.
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ESTABLISHMENT OF CHEMICAL COMPLEX IN SIBERIA RECOMMENDED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Oct 79 p 1

[Article by V. Popov, doctor of economic sciences, and V. Tumin and Yu. Fridman, candidates of economic sciences, Kemerovo: "Potentials of Large-Scale Chemical Industry"]

[Text] At present the chemical and petrochemical industry is being developed on a preferential basis in the country's European regions, whereas the basic sources of raw materials are located in the east. As a result, for every ton of polymer output produced in western regions up to 10 tons of conventional fuel are transported from Siberia, which leads to considerable material expenditures. In the near future transport expenditures will reach 500 million rubles.

However, the matter is not confined to transport costs. Fertile land in western regions is withdrawn from agricultural turnover for chemical facilities. Their ecology deteriorates. Furthermore, it should be taken into consideration that the Siberian region accounts for more than one-third of the country's water resources. In that region there are nonagricultural areas suitable for the construction of chemical enterprises. Finally, quite powerful construction organizations are already being formed in the regions of possible concentration of chemical and petrochemical production facilities.

Today Siberia produces only about 9 percent of the chemical output. In the last few years this ratio has hardly changed and in a number of important products from 1965 through 1978 the "Siberian share" was even reduced: by a factor of 1.6, in the production of synthetic resins and plastics, by a factor of 1.4, in the output of chemical fibers and in one-half, in the output of mineral fertilizers.

Now let us compare the geography of production with the distribution of raw material resources. More than 75 percent of the fuel reserves are concentrated in Siberia and only 10 percent, in European regions. Siberia has a large amount of nearly all types of raw materials needed by chemistry and petrochemistry, including the most efficient, that is, byproduct and natural gas and gas condensate. Suffice it to say that by the end of the

11th Five-Year Plan from the byproduct gas and gas condensate of West Siberia the Tobol'sk Petrochemical Complex can obtain more monomers and rubber than produced by the entire domestic industry in 1975.

It is important to note that Siberian resources are not only considerable and diverse, but also have a high point concentration. This means that it is possible to obtain considerable savings of transport costs for the conveyance of source materials. For example, the plan of the Tobol'sk Petrochemical Complex hardly utilizes railroad transport for providing basic production with raw materials. For the sake of comparison we will state that the bulk of the raw materials is delivered to the Nizhnekamsk Petrochemical Combine by railroad.

It can be stated with confidence that in Siberia there are objective conditions for the development of a powerful chemical and petrochemical complex.

The Institute of Economics and Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences together with the Tyumenskaya Oblast Party Committee held an all-Union conference in Tobol'sk last November. Workers at the USSR and RSFSR state planning committees and at some ministries took part in it. The conference considered it advisable to establish in Siberia large-capacity facilities for the production of synthetic rubber, plastics, synthetic resins and chemical fibers with a view to increasing their share in all-Union production to 30 or 50 percent. Furthermore, the conference recommended the development of the production of plastic pipes, polymeric building and heat insulating materials, films and polystyrene for its own needs. Since in Siberia there are local raw material resources, at their base it is profitable to create capacities for the output of phosphorus and potassium fertilizers, which today are transported from the west, as well as to build large-capacity units for the production of protein and vitamin concentrates.

These are general recommendations. With regard to distribution, in the western regions of Siberia there are exceptionally favorable conditions for the development of the production of synthetic rubber and polymerization plastics. In eastern regions it is possible to obtain the cheapest organochlorine products in the country. Latitudinal specialization is also advisable; for the regions north of the Trans-Siberian main line, in initial petroleum and gas refining and for the regions south of it, in the final stages, where more people are employed.

Increase in the intensification of production, as compared with the average sectorial intensification, is the decisive factor ensuring an efficient development of the Siberian chemical complex. At present the chemical enterprises operating there in their technical level do not differ from similar enterprises in the country's other regions. Often this level is even lower than the average sectorial level. For example, ammonia production facilities with the most backward technology based on the gasification of solid fuel remained only in Siberia. Obsolete flow diagrams

are used in the production of a number of products at the Krasnoyarsk Synthetic Rubber Plant and at the Azot (Kemerovo) and Khimvolokno (Barnaul) production associations. Hence the high cost of the products produced at them.

Probably, the formation of chemical units should be based on the special "Siberian" technology and equipment. In practice, chemical facilities in the country's various regions are usually established according to a unified model with some modification in the heat insulation design. With the relatively small scale of the sector's development in eastern regions this was economically justified. At the present stage and especially in the future the need for technical policy differentiated according to the country's zones is ever more obvious.

The results of investigations show that the high efficiency of Siberia's chemical complex is connected primarily with the development of large-capacity equipment and industrial processes with few stages and with a high degree of mechanization and automation of production in this region. The Tobol'sk Petrochemical Complex can serve as an example of such an approach. Original highly efficient single-stage processes developed by Soviet specialists are used in the production of basic types of products at it. Installations of a large unit capacity are used. Owing to this, the planned labor productivity there is three times as high as at similar production facilities of the present flagship of petrochemistry--the Nizhnekamsk Petrochemical Complex.

It is advisable to limit the distribution of small-capacity production facilities in Siberia. Unfortunately, in the last decade this requirement was often ignored. A large number of small-capacity production facilities appeared. Their establishment, which in its essence contradicted the technical and economic specificity of Siberia, had an unfavorable effect on the efficiency of the entire local chemical complex. The Usol'ye Khimprom Production Association proved to be especially attractive for the placement of small-capacity production facilities. A whole group of them was established at it. The low economic work indicators of this enterprise for a number of years are largely due to this.

Nor can we ignore the characteristics of the Siberian region, which often are not taken into consideration when new enterprises and production facilities are planned and existing ones are reconstructed. With the arrival of cold weather, usually, Siberian chemists face additional difficulties. Chemical apparatus and pipelines located on open ground freeze. In these cases people have unkind words not only for the weather, but also for installation men--for insufficiently good insulation--and very often for both planners and designers, who in their studies did not make a correction for the climate.

A study of the climatic and other characteristics of Siberia during the establishment of new chemical facilities can and should be organized right now. Scientific research and planning organizations are to play an

important role in this. As yet, however, there are very few of them, that is, Siberia accounts for less than 2 percent of the all-Union number of specialists employed in these organizations. Despite the fact that the majority of subsectors of the chemical and petrochemical industry have already been formed there, a number of head planning organizations of these subsectors do not have Siberian affiliates. It is not surprising that planned solutions for many facilities are worked out by organizations located in the center of the country. This hampers authors' supervision and delays the coordination of changes in and supplements to plans.

Siberia as a region and its chemical industry have vast, heretofore unutilized, potentials. Their mobilization will give a great deal to the country's national economy and, as we see, additional capital investments in excess of those planned for the sector's development, in practice, will not be needed. The latter circumstance should be considered especially important when determining the strategy and tactics of further development of the country's chemical and petrochemical industry.

[68-11,439]

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CSO: 1841

CONSTRUCTION LAGS AT DNEPRODZERZHINSK CARBAMIDE PLANT CRITICIZED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Oct 79 p 3

[Article by G. Ovcharenko: "Resigned to Defeat"]

[Text] "You want to know about Dneprodzerzhinsk Carbamide?"

V. Slyshko, the chief engineer of the Dneprometallurgmontazh Trust queried and then sharply drew the edge of his palm across his neck. "That's what we think about that carbamide!"

As it turned out, during the present year the organizations of the trust, mainly the Khimmontazh management, were supposed to have assimilated approximately R 2 million here and to have turned the complex over to the chemists of the local nitrogen association. You will agree that this is no small amount. But according to the calendar it is mid-October, and the assembler mechanics have assimilated only somewhat more than R 300,000. And even that went for laying piping along the working intershop scaffolding. Work directly on the project under construction has not been started, however, and it is unknown when it will be begun: the readiness for construction is null.

The position of the republican planning organs is most surprising. They programmed the capacities of the Dneprodzerzhinsk Nitrogen Association without regard for either the norms for duration of construction or for the real resources of the local base of the construction industry and the general contracting trust Dneprokhimstroy. Consequently the ammonia complex was delivered with a delay of one year. When the erection of the carbamide unit at full speed was already expected under the plan, the builders were still doing crash work on ammonia.

Did they know about this at the republican gosplan when they approved the commission of the carbamide complex for the present year? Undoubtedly! But no one here undertook to make a sober evaluation of the situation that had arisen and to plan practicable deadlines for the start-up of operations.

The builders are not hiding behind the screen of such "objective" causes. Hence the calm that reigns now over the projects of the complex and the quiet tone in which the deputy administrator of the Dneprokhimstroy Trust, V. Bogomazov, carefully enumerated for me the "objective" causes of the lag. He says, we builders had nothing to do with it, the planners have forced us to our knees.

"But this is all in the past, isn't it," I objected. "And what are you doing today to correct the situation?"

"In order to speed up work," Valeriy Aleksandrovich boldly replied, "two construction trusts, Dneprovskpromstroy and Dzerzhinskstroy, have been equipped. So we are doing everything within our powers."

Is that everything?

According to the plan approximately 800 Dneprokhimstroy workers are supposed to be working on the site. According to V. Bogomazov, more than (take note of this!) 300 are now at work. In fact, however, I counted less than 100. And Dneprovskpromstroy and Dzerzhinskstroy, which were "equipped" two months ago, have not started work at all.

Moreover, the general contractor selected a rather strange strategy for a construction start. The trust's main efforts were by no means focused on the three units of the complex which resolve the fate of the start-up but where it would be possible to "snatch away" large amounts without special effort.

After this is it any wonder that the planned goals at the carbamide complex have still scarcely been 50 percent fulfilled? And this at the same time that V. Bogomazov, the general contractor, no longer feels any need for labor resources. So what is the matter?

"The builders simply gave up on carbamide," a brigade leader of the Dneprometallurgmontazh Trust, S. Yarovoy, a bearer of the orders of the Red Banner of Labor and the October Revolution, gave me his viewpoint. "I can't understand them. So, o.k., the complex can't be delivered this year. But just the same, in order to obtain a product essential to the country as fast as possible, the attitude toward the construction project must be radically changed."

I have been on the construction site more than once. And each time I was amazed: there were neither stands showing who was working and how nor socialist pledges. There were not even the posters usual at any construction project calling for speeding up the rate of work and finishing it on time. It looks as if S. Yarovoy is right: the builders have resigned themselves to defeat. Yet today it depends on them alone whether the assemblers will be able to start work and how fast the carbamide production complex at the Dneprodzerzhinsk Nitrogen Association can

become operational. And this fact cannot be hidden behind any "objective" causes.

[67-9830]

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CSO: 1841

NEW SODIUM SULFATE PLANT

Moscow SOTSIALISTIDHESKAYA INDUSTRIYA in Russian 11 Nov 79 p 1

[Article by V. Vol'nov: "They Kept Their Word"]

[Text] The November demonstration of workers in the village of Bekdash, located in the outer portion of northwestern region of the Karakum desert, was opened this year by the CMU-2 collective of the "Turkmenkhimstroy" combine and its contractors. Under difficult weather conditions, and in spite of many difficulties in getting supplies of materials and equipment, the builders managed to keep their word: they introduced a new sodium sulfate production facility at the association "Karabogazsul'fat" one and a half months earlier than anticipated by the plan.

After the first product was obtained on this new technological line, and after the state commission signed the document, the last meeting of the operational staff of this construction was held. Towards the end of the meeting I asked some of the members of the staff to comment on the event. Their comments follow.

V. Grishchenko, chief of staff, general manager of the production association "Karabogazsul'fat":

"In the life of our collective, the timely introduction of the new unit is the most emotional and happy occurrence of the last years. Frankly, it was hardly possible to hope that the builders would complete such a difficult task in time. But they dispelled our doubts with well organized labor, full of self denial.

When this new potential is mastered, and I think that it will be in the first quarter of next year, the total output of sodium sulfate by our plant will be among the highest of the domestic production of the Minkhimprom: about 250,000 tons annually. In addition, by using this new facility, we will significantly increase production of such short supply chemical products as apsomit, bishofit, and glauber salt."

P. Dvoychenkov, chief of the Krasnovod administration of the collective "Turkmenkhimmontazh" Mirmontazhspetsstroy USSR:

"First of all, I would like to note the way in which the general contractor organized the project. The builders did not look for "easy", expensive jobs, as, unfortunately, it is still done to this day on large constructions. The foundation was built not on instant gain, but on the end result."

N. Tikhomirov, chief of SMU-2 of the collective "Turkmenkhinstroy", Minstroy of Turkmen SSR:

"I came to Bekdash ten years ago. Then, there was nothing here except for some craft shops, a few houses and about twenty yurts (tents). And now, a settlement with total comfort has appeared: a completely modern township. So far, it is still a small one, but this is just a beginning.

In ten years, for the main undertaking alone, we built about 60 units for production purposes. All of them were accepted with "good" to "excellent" evaluations. Experience gained in their construction helped us in accelerating the introduction of the main facilities.

Along with a considerable advance with respect to the projected schedules, the construction of housing and sociocultural facilities took place. Characteristically, our living problems are practically solved. This played an important role in lowering the turnover of working cadres, and in strengthening work discipline.

Only one aspect leaves a bitter taste, and I must mention it. Inside this territory, all elements of Mendeleyev's table are hidden. So far, we have utilized only a very small portion of the plentiful warehouse of nature. And yet, to this time there is no scientifically based program for the development of our young industrial region. I believe that the Minkhimprom, the Soviet on the study of productive manpower, and the USSR Gosplan should provide us with a plan in the near future."

Today, the first tons of the blindingly white powder of sodium sulfate obtained in excess of the plan went to the Kaspian port by a narrow gage railroad. The builders kept their word, and for that, we owe them respect and appreciation.
[66-7813]

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CSO: 1841

LIQUID FERTILIZER PRODUCED AT KRASNODAR

Moscow SEL'SKAYA ZHIZN' in Russian 19 Oct 79 p 2

[Article by Yu. Semenenko: "A Giant in Formation"]

[Text] Production of complex liquid fertilizers was started at the Krasnodar Chemical Plant.

Quite recently, less than three years ago, this place was vacant. Now, here near the regional township of Belorechensk, the breakthrough construction of the tenth five year plan has been completed: the Krasnodar Chemical Plant.

The section of complex liquid fertilizers, equipped with the most modern equipment, was also activated. All units were accepted by the labor commission with good rating three months prior to the projected deadlines. Construction was completed on railroad lines, on the principal structure, on the reactor, on warehouses for crude material and final products, including all the supporting services - two units with 200,000 tons capacity each, on a nitrogen gassification station, water recirculation system, etc. All units have automated modern equipment, to exclude manual labor.

Annually, this shop will produce 660,000 tons of the most effective fertilizers containing 10 percent nitrogen and 34 percent phosphorus. That which was predicted by the multifaceted agreement of February of this year between the builders and the operators has occurred. About 40 construction, assembly and finishing companies participated in the construction of this productivity giant.

Without a break, the work continued on numerous sites for many days and nights. Two and three shifts were used. Hundreds of people, united with the single goal of starting the production of material so impatiently awaited in the countryside, manifested highly productive work. Just prior to the opening date, the construction workers labored with added intensity. Several months in a row, the banner of the labor glory was raised to acknowledge the effort of the second section, SMU-56, headed by

A. S. Nogina. A. Kuteynikov, the assembly brigade of V. Menyaylov, the insulator R. Fomina, and others became heroes of the construction.

The new shop shines with cleanliness and order, as expected of a chemical installation. The director of this shop, M. N. Smolenko, is satisfied: the builders have come through, and all automatic instruments work according to specifications.

The shop collective helped the construction workers in the assembly and fine tuning of the equipment, and learned along the way, gaining valuable experience. "Already, we have mastered the daily and potential capacity by 70 percent. In the next few months we will reach the planned performance level," says Mikhail Nikolayevich.

In the "brain center" of this shop, a room with the control panel, we met the chief of the leading shift of the day, Ye. A. Shilova. Looking at the multicolored lights on the panel, connecting by steel nerves all production equipment, Evgeniya Aleksandrovna said:

"The country workers face greater and more complex tasks, and we are doing everything possible to help them in completing these tasks successfully."

The entire shop area is decorated festively. Thousands came to the meeting devoted to the opening ceremonies of this new production unit. In response to the warm greetings from Leonid Il'ich Brezhnev, the construction workers and the chemists pledged to work effectively and enthusiastically, and to master the new potentials of this plant ahead of the schedule. The participants of this meeting solemnly accompanied 20 trucks with liquid fertilizer out of the plant, heading towards Ust'-Labinsk region, where the farmers have achieved highest yields of their crops for a number of years.
[66-7813]

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CSO: 1841

GROZNYY REFINERY ON STREAM AHEAD OF SCHEDULE

Moscow PRAVDA in Russian 3 Nov 79 p 1

[Article by V. Artemenko: "The Bud of Rejuvenation"]

[Text] A large petroleum refinery, with an annual capacity of several million tons, has been activated in Groznyy, two months ahead of the projected due date.

The petroleum refineries in Groznyy have been active for about a century. Forty years ago, the equipment was updated for the last time. In the meantime, wear and tear on the equipment was considerable. On top of it, a new work load was added: the Checheno-Ingushetiya began to accept petroleum for refining from many regions. In order to be able to "crack" the incoming product quickly and qualitatively, the Groznyites decided to rebuild the existing facilities, and to construct new ones. ELOU-AVT, the electric desalting equipment with an atmospheric-vacuum piping system, represents one of the buds of the rejuvenation process at the Groznyy plants.

Today, the builders have cause for a celebration. In two years and ten months time they have appropriated 40 million rubles in capital investment at the petroleum refinery Imeni V. I. Lenin, under complicated conditions of an existing operation. The planned goals on the growth of productivity have been surpassed, labor losses were diminished. The effort of the personnel of the Checheno-Ingushetiya construction administration area of Minpromstroy USSR, of "Kavelektromontazh", of "Tsentrospetsstroy", of "Montazhtermoizdeliye", and of the Mirmontazhspetsstroy of the USSR, was excellent.

The builders did not work in vain. The two months lead time on the activation date of the facility will make it possible to refine additional hundreds of thousands of tons of petroleum, and to increase production by several million rubles.

"This new facility represents one of the stages of the thorough reconstruction program of petroleum refineries and of the petrochemical industry

in our republic", said the secretary of Checheno-Ingushetiya OBKOM, CP USSR, L. Magomadov. "During the construction period, the fraternal assistance from all the peoples of the USSR and of socialist countries was evident. Here, representatives from many Union republics worked shoulder to shoulder with specialists from the GDR."

The working force of this complex facility entered the round-the-clock pre-holiday schedule.
[66-7813]

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CSO: 1841

NEW 60,000 TON PER YEAR POLYETHYLENE PLANT PLANNED

Moscow KRSNAYA ZVEZDA in Russian 23 Oct 79 p 4

[Article by I. Kalashnikov: "Continuation of 'Polymir'"]

[Text] Polyethylene is known as the "king of plastics". Such high praise is infinitely justifiable because it shows many of the leading qualities of synthetic materials. A variety of goods produced from polyethylene can be found in each household: storage containers, toys, bath tubs, cans. The practical and quite inexpensive greenhouse panels are very popular. In the cable industry, this plastic simply has no competitor in the area of insulation. Pipes made from this plastic defy corrosion, and they can be used in improved constructions. This valuable product can also be used in production of various machine parts, comparable in strength with metal products.

This material is produced at high temperatures and pressures of 1500-2500 atmospheres; only under such conditions is it possible to carry out this highly productive process with assurance of required quality. Various specialists spent a lot of time working out the details needed to assure reliable performance of the equipment under such conditions.

Several years ago, a large modern polyethylene production plant was opened in our country, at the Polotsk Chemical Combine Imeni "50th Anniversary of BelSSR". The plant, designed by Soviet and German experts, has a production capacity of 50,000 tons of plastic per year, and it was named "Polymir-50", representing the Soviet and German names of the "king of plastics": "polyethylene" and "miraten". Our own experts and those from the German Democratic Republic who participated in this project were awarded the USSR State Prize.

However, the requirements for polyethylene continue to expand rapidly, because of its use in many areas of the national economy. Therefore, the builders and the technologists continue to improve existing equipment, while designing even larger new plants. For example, a production plant "Polymir" has already been designed for the GDR with an annual production capacity of 60,000 tons. In this country, construction is planned for

several technological lines of the "Polymir" type, each with an annual polyethylene production capacity of 75,000 tons.
[66-7813]

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CSO: 1841

NITRIC ACID PRODUCED AT NOVGOROD PLANT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Oct 79 p 2

[Article by O. Fedichev: "Plant of Plants"]

[Text] The first production of dilute nitric acid has been achieved at the production plant of the Novgorod Association "Azot". One of the important goals of the socialistic obligations of this collective was achieved during the fourth year of the five-year plan. Introduction of this 380,000 tons annual production capacity plant will make it possible to double the output of mineral fertilizers.

Rightfully, this new production complex is called a "plant within a plant".
[66-7813]

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CSO: 1841

SECOND LINE OF ODESSA AMMONIA PLANT PUT INTO OPERATION

Moscow TRUD in Russian 4 Nov 79 p 1

["Article by Ye. Zabortsev: "A Giant of Chemistry Put Into Operation"]

[Text] The second line of the Odessa port plant has been put into operation, outstripping the planned deadlines by three and a half months. Its capacity is now 900,000 tons of ammonia per year.

Six years ago the first builders arrived on the shore of the Adzhaliyskiy Estuary. They began to build a giant of the chemical industry--the Odessa port plant. The republican Komsomol shock construction project called on hundreds of workers of the Ukraine and other republics, cities and villages of our country. The specialized port of Yuzhnyy for processing exported and imported chemical shipments and the plant for producing liquid ammonia adjacent to it were also created by their labor.

In the new port gigantic tankers moor at deep-sea moorages equipped with powerful technology and automatic machines. Fourteen heavy-freight vessels were handled by the port of Yuzhnyy in September. The diesel vessel Mayori, which has just arrived from the Baltic Sea region, has connected up to the main line. Liquified ammonia has started into its tanks in a powerful stream. And here a Greek dry-cargo ship has made fast; it takes on 12,000 tons of carbamide.

"Our longshoremen have joined in socialist competition for high efficiency and quality of work," the assistant chief of the port of Yuzhnyy, V. Khomenko relates. "From the moment the first line was put into operation 229,000 tons of ammonia have been manufactured; more than a million tons of chemical products have been loaded at the plant moorages. The present shock duty in honor of the 62nd anniversary of October is the second in the work biography of the port of Yuzhnyy.

The workers of the port factory builders' collective worked with the greatest possible speed. For it was only very recently--on the eve of 1979--that the first unit for manufacturing liquid ammonia was put into

operation. This was a great victory, to which the party and the government paid high tribute. The start-up of the new plant's second line ahead of schedule will enable the chemists to obtain above-plan production amounting to no less than 7.5 million before the end of the year and will ensure uninterrupted shipment of ammonia for export.

The port plant has begun to work full force and has reached its planned capacity. Everything is being done so that the workers of the new production complex may work and live under good conditions. Next to the factory a new, modern, chemists' settlement has gone up. Lodgings, a school, a children's center, and a department store have been built, and a polyclinic and a Palace of Culture are being erected.
[67-9380]

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CSO: 1841

NEW AMMONIA PRODUCTION FACILITY AT CHERKASSY

Moscow IZVESTIYA in Russian 2 Dec 79 p 1

[Article by G. Budanov: "Beyond This Height - Another"]

[Text] A new production complex was introduced at the Cherkassy Association "Azot", designed to produce 450,000 tons of ammonia annually.

The miraculous process of chemical reactions is hidden from the human eye. It occurs inside the complicated equipment of the just opened production complex.

The Cherkassy plant is interesting in several ways. This is a highly automated plant with excellent equipment. The success of this undertaking is based on modular construction methods, on reinforced block mounting of the construction and technological equipment, and on brigade contracting.

Competition, based on the principle of "work relay", yielded remarkable results, notes the secretary of Cherkassy Party Obkom Yu. Krushinsky. The atmosphere of mutual assistance was appreciated most of all. While competition occupied the central attention of the party organization, the agreements among neighbors were under control of the workers.

The brigade headed by the hero of Socialist Labor, the Representative to the Supreme Council of the USSR, V. Zabolotnyy, introduced the novel relay approach. The cement molds from water resistant plywood used by his brigade made it possible to achieve a surprisingly clean construction surface, reduced losses and increased time economy.

The brigade of mechanics and assemblers, led by N. Budantsev, will always remember the days when the technological pipelines were butt joined and welded. The fiery seam was applied to 2,500 pipe joints with different inside diameters. According to standards, this job required three months for completion. This brigade did it in a month and a half.

However, a special recognition is due to the assemblers employed on special operations, hoisting oversize, heavy equipment. The normal methods, employing cranes, towers or block pulleys, could not be used. Hydraulic lifts had to be employed. A 60 meter absorbed column was placed in a preplanned position in a few hours. The participating brigades of I. Ryl'chenko and A. Kurchi saved twenty days for the construction.

The production complex "Ammyak-450" grows stronger. Next to it, a 132 meter granulation tower is being raised. The production of carbamide, a concentrated type of fertilizer, is in the incipient stages. The Cherkassy builders are fully committed to complete this project on schedule as well. The collective adopted the rule to reach for one height after another in their work.
[66-7813]

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CSO: 1841

AMMONIA PIPELINE: FIRST STAGE COMPLETED

Moscow STROITEL'NAYA GAZETA in Russian 12 Oct 79 p 1

[Text] The first stage of work on the Tol'yatti-Odessa ammonia pipeline construction was completed yesterday. The pipeline was filled with liquid ammonia from Gorlovka to Odessa, a distance of 815 kilometers. We asked the Deputy Minister of Chemical Industry of the USSR, V. Koval' for a comment:

-The ammonia pipeline being constructed is a unique, technically complex construction with no equals in Europe. Here, for example, for the first time, sectioning posts, equipped with ball valves, which, in case of a pressure drop in the pipeline, would automatically bridge over the segments of lower pressure, signalling shutdown of ammonia transport, have been designed. The remote control and operations of all ammonia pipeline units is achieved by means of computers.

The pipeline is designed for the transport of liquid ammonia, the most effective nitrogen fertilizer, to rural agriculture units in Southern Ukraine, and for the export of liquid ammonia through the new port facilities of "Yuzhnyy", built together with supporting facilities near Odessa. I should note that, in this year, the construction of two large ammonia plants was completed in Gorlovka, as well as facilities for the receipt, storage and loading of liquid ammonia in special tankers--the ammonia cars at the near port facilities in Odessa. The constructed segment of the ammonia pipeline joined these two complexes: through the pipeline, Gorlovka ammonia reached the Odessa port plant.

The opening of the ammonia pipeline will liberate several hundred railroad tanks and considerably lower the load on railroad transport.

Congratulations are due to the builders of Dniavukr neftegazstroy, to signal men, chemists, and designers, for the first important work success. During the next weeks, the final tuning up should be accomplished on the signal and automatic control systems of the ammonia pipeline, and it should be presented to the state commission.

[66-7813]

VOLGOGRAD SHOP TO PRODUCE EQUIPMENT FOR PETROCHEMICAL PLANTS

Moscow IZVESTIYA in Russian 19 Oct 79 p 2

[Article by Yu. Kanov: "Branch Flagman"]

[Text] A construction shop is being erected on the Volgograd plant Imeni Petrov for the production of giant equipment for the petrochemical industry.

Currently, most of the petrochemical industry requires large equipment. To prepare such units, giant shops are needed. One of such shops, the Boiler-Welding shop No. 6, is being constructed at the Volgograd Plant Imeni Petrov.

It raises high over other plant buildings, like an ocean liner over small boats. This new shop is about 500 meters long and 100 meters wide, covering the total production area of 50,000 square meters. Almost 10 football fields could be placed under its roof.

Among all the dimensions of this giant shop, we are interested most in the arch span height, notes the deputy secretary of the Party organization at this shop, engineer G. Chukhonastov. It is almost 12 stories high. At the 36th meter mark of the second story, a 250 ton crane has been mounted, a little further on--another, similar one. Together they can lift a load of 500 tons. An automatic thermal kiln is already operational.

We walk along the arches of this giant shop. Enormous apparatuses, resembling whale carcasses, are all around: gas holders, absorbers, various technological columns.

This gas holder was built for Cuba. And this 210 ton reactor will be sent to Yugoslavia, says Gennadiy Mikhaylovich. Ahead, metallic girders come into view. Here a unique transportation system is being assembled, the so called transborder, used for intra-shop transportation of giant apparatus. This system will accelerate the building of oversize petrochemical equipment, facilitating working conditions. The transborder will make it possible to relocate units exceeding the weight of 800 tons from one section of the shop to another.

In the well known proverb saying that if the mountain will not come to Mohammed, Mohammed will come to the mountain, the second alternative was always considered to be the more logical one. This approach was also taken here: the men used to come to the "mountain", that is towards the reactor being built, they welded the seams, they tested the reliability of the walls, etc. This obviously diminished their work productivity. With this type of work organization it was difficult to mechanize the production and even more so to automate it.

The transborder will become the connecting link of the internal conveyor. It could pick up on its transport platform a reactor and deliver it from, let's say, the welding assembly area to the betatron room, where gamma rays would be used to test the quality of the welded seams. Then the transborder could move the reactor on to the blasting and painting areas, and so on, along the entire technological line.

Currently, the maximum weight of most of the chemical equipment produced at the plant Imeni Petrov is about 250-300 tons. Opening the new shop No. 6 gives the plant the capability to produce units weighing 600 tons and more. This is about what the petrochemical industry needs now.

The size of this new unit will make it possible to unload giant apparatus in the assembled state. At this time even considerably smaller reactors must be disassembled before shipping to the desired location, where the final reassembly must take place. This takes up a lot of time and lowers the quality of the end product. Transportation of giant apparatus ready for plant operations will accelerate the assembly at the sites of petrochemical plants being constructed.
[66-7813]

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CSO: 1841

CONSTRUCTION OF CAPROLACTAM PLANT DELAYED

Moscow STROITEL'NAYA GAZETA in Russian 14 Sep 79 p 1

[Article by I. Khaziyev: "The Deadline Has Passed"]

[Text] The principal work load on the construction of the actuating complex for the production of caprolactam at the Chirchik Association "Elektrokhimprom" belongs to the subunits of the Uzbek SSR Minmontazhspestroy. From the 19 million rubles allocated for this year, they appropriated about nine million in eight months, or somewhat more than a half of what was proposed for that period.

What is the reason for this lag?

"Primarily", answers the first deputy of the republican minister of assembly and special construction projects I. Borodavko, "the problem is that the actuating complex is poorly supplied with special materials, technological equipment, and pipe lines, even though the deadlines for their delivery have long since passed.

Today we are short 40 units of technological equipment, a large number of shut-off fixtures, branch pipes, T-joints, etc.

The construction readiness of the objects built by combine No. 160 and other Ministroy organizations is very poor. Because of this, the mechanical assembly work on the pumps for the reversible water supply, work on the waste combustion unit, on reagent storage, and petroleum residue handling is delayed.

The situation is made even more complex by poor technical documentation produced by the Chirchik branch of the GIAP. A third of the working diagrams connected with pipe assembly alone had to be redone.

Seventeen hundred assembly men are working on this construction, and their number will soon reach over three thousand. Today, it is especially important to provide them with sufficient work so that this important complex of the national economy could be activated during the fourth quarter of this year.

[66-7813]

BRIEFS

AMMONIA PRODUCTION--The second high tonnage ammonia unit has been put on line at the Odessa Port Plant 15 days ahead of schedule. The first similar unit was put into operation also ahead of schedule. A mechanized facility for transloading ammonia onto maritime vessels has also been put into operation. [Excerpt] [Moscow STROITEL'NAYA GAZETA in Russian 19 Sep 79 p 1]
[102-P]

CHLORINE AND CAUSTIC SODA--The first electrolyzers in the production of chlorine and caustic soda have been put on line at the Ziminskiy Chemical Plant. This marks the beginning of industrial exploitation of the richest deposits of rock salt in eastern USSR. The plant will be one of the most modern enterprises of the industry. In coming years, high capacity facilities for the production of vinyl chloride and polyvinyl chloride will be put into operation here. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 11 Nov 79 p 2]
[104-P]

SULFUR PLANT EXPANDED--L. Vinogradov, State Commission Chairman; M. Dzhamakulyyev, Deputy Minister of Construction for Turkmen SSR--At the Guardak Sulfur Plant, the State Commission has accepted for operation the second stage of the sulfur production complex using the underground melting method. Construction, installation and operational crews have assured that the PVS-100 complex was commissioned ahead of schedule in the third quarter of 1979. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 7 Oct 79 p 3]
[105-P]

AROMATIC HYDROCARBON COMPLEX--An aromatic hydrocarbon complex, the largest in Siberia, is being built in the Omsk "Omsknefteorgsintez" (Omsk Petroleum Organic Synthesis) Association. The final state of the work in delivering large equipment for the complex has now begun. Putting the new production facility on line will permit the Omsk oil refiners to considerably expand the product mix. [Text] [Moscow IZVESTIYA in Russian 25 Dec 79 p 2]
[103-P]

LIQUID PARAFFIN PRODUCTION--Kuybyshev--A complex, the first of its kind in the USSR for the production of liquid paraffins by the "Pareks" method, has been put into operation at the Order Lenina Novokuybyshev Petroleum Refinery. Several thousands tons of the valuable product have already been obtained. Liquid paraffins are the initial raw materials in the production of protein and vitamin concentrates used to fatten agricultural animals. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 4 Dec 79 p 1]
[101-P]

UKHTA OIL REFINERY--The Ukhta Oil Refinery has attained the volume of output planned for the end of the Tenth Five-Year Plan period. In the first 4 years, its production increased 15.6 percent. Fifty eight percent of its products are put out with the State Mark of Quality. [Text]
[Moscow PRAVDA in Russian 12 Jan 80 p 1]
[100-P]

REFINERY IN LITHUANIA--Adjustment of equipment has begun at the Mazheykyay Petroleum Refinery, the pioneer among Lithuanian petroleum chemists. Silvery cracking towers, where crude is refined into high-octane gasoline, diesel fuel and lubricants, were erected on a huge area. Water purification installations were readied and gas vapor traps were built to protect reliably the environment from pollution. Crude is already flowing in the Polotsk-Mazheykyay pipeline. Together with the refinery, the small town of Mazheykyay is growing; it will become the town of petrochemists and construction workers. [Text] [Moscow IZVESTIYA in Russian 9 Dec 79 p 3]
[99-P]

FERTILIZER FROM GRODNO--(TASS)--The automated complex "AMMIAK-3" (Ammonia-3) in the "Azot" Association imeni S. O. Pritytskiy was put on line at the designed capacity yesterday. It will produce 1,360 tons per day of raw materials for mineral fertilizer production. Equipment installation time was cut by 6 months with the help of crews from related domestic associations. The sectorial scientific center trained dozens of highly skilled operators and workers in other trades. Part of the cadres was transferred from existing shops of the association. Experience gained in the accelerated mastery of capacities on previously started-up lines will be useful. [Text] [Moscow TRUD in Russian 30 Nov 79 p 1]
[106-P]

FERTILIZER FROM NOVGOROD--A new complex for the production of mineral fertilizer with an annual capacity of 750,000 tons has been put into operation at the Novgorod "Azot" Production Association imeni 50-Letiye Velikogo Oktyabrya. Several hundreds tons of the product have already been produced. The complex includes facilities for the production of ammonium nitrate and dilute nitric acid. Machine building industries in Leningrad, Khabarovsk, Belgorod and Sum manufactured the principal equipment for the nitric acid production unit, whose capacity exceeds those now existing in the USSR by a factor of three. Annual output of mineral

fertilizer will total more than 3.5 million tons once the new complex reaches designed capacity. At present, kolkhozes and sovkhozes in 25 oblasts in the Russian Federation, the Soviet Baltic and Belorussian republics receive these "vitamins of the fields" from Novgorod. [Text] [Moscow IZVESTIYA in Russian 7 Dec 79 p 3] [107-P]

FERTILIZER OUTPUT UP--The Tol'yatti Nitrogen Plant has significantly increased the production of fertilizer. A third high tonnage ammonia unit has been put into operation here. Fertilizer output has now been raised to 1,350,000 tons. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 3 Jan 80 p 1] [108-P]

FERTILIZER PRODUCTION AUGMENTED--Samarkand--The second section of the Ammofos complex built at the Samarkand Superphosphate Plant has been put on stream. The annual designed production output of the new facility is 700,000 tons of fertilizer. It has been put on line in two thirds of the normal scheduled completion time. During the four months thus gained by the prescheduled completion, farmers will be provided with additional thousands of tons of nitrogen-phosphorus fertilizer. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 79 p 3] [109-P]

MORE FERTILIZER--Tol'yatti, Kuybyshevskaya Oblast--The third ammonia unit with an annual capacity of 450,000 tons of fertilizer has been put into operation at the "Kuybyshevazot" (Kuybyshev Nitrogen Production) Association. This is the third large successful venture of the "Kuybyshevgidrostroy" (Kuybyshev Hydro-Production Facilities Construction Trust). In October, the State commission signed a document concerning the putting on stream of the first two ammonia units; and in December, the first carbamide facility was put on line. Our chemical industry has not yet known such high construction rates and the putting into operation of such large tonnage facilities. For the first time during the course of one year, three ammonia facilities with a total annual capacity of 1.35 million tons and a carbamide unit with an annual capacity of 480,000 tons and put on line. [Excerpt] [Moscow PRAVDA in Russian 1 Jan 80 p 1] [110-P]

YAROSLAVL' SYNTHETIC RUBBER--Yaroslavl--The important step of equipment replacement has been completed at the Yaroslavl' Synthetic Rubber Plant. The second stage of a large complex for the production of isoprene rubber has been put into operation. The new production facility is fully automated. The enterprise (where almost half a century ago the first kilograms of synthetic rubber were produced for the first time in the world) now produces annually tens of thousands of tons of high quality products. Radical reconstruction of this veteran of the industry, accomplished

under conditions of on-going production, and the constant modernization of equipment and technological processes made the constant augmentation of capacities possible. The production of a large number of new types of products has been mastered here. The Yaroslavl' Plant will more than double the output of synthetic rubber once the planned output levels for the isoprene rubber complex are attained. Competition for the assimilation of the new equipment is underway at the plant. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Dec 79 p 2]
[111-P]

SYNTHETIC RUBBER PLANT--Chaykovskiy, Permskaya Oblast--A synthetic rubber plant is being built on the Kama River in the vicinity of this young town. The plant is designed to process thousands of tons of raw materials annually. A central gas fractionating complex has recently been put on line here. It processes natural Siberian gas and produces the essential principal intermediate products (propane, butane, isobutane) in the production of synthetic rubber. The first lots have been shipped to users. At the same time that the Chaykovskiy industry supplies raw materials to domestic industrial enterprises, they will supply gas for household use in neighboring cities in the Urals. [Text] [Moscow SEL'SKAYA ZHIZHN' in Russian 16 Nov 79 p 1]
[112-P]

MORE SYNTHETIC RUBBER--Mass production of synthetic rubber was achieved for the first time in the world in Yaroslavl' 47 years ago. It was at the Yaroslavl' Synthetic Rubber Plant that the production of synthetic latexes, which were to be widely used in many sectors of the national economy, was successfully mastered. At the end of 1979, the first stage of a high capacity complex for the production of isoprene rubber was put into operation. Structurally the product is close to natural rubber. Its use in tires and in industrial rubber articles will give them high durability. The plant's director, B. Germanov, declared that the new facility will increase output by a factor of 2.5 and will raise labor productivity. This is an important step in the technical development of the plant. [Excerpt] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Jan 80 p 2]
[113-P]

QUESTIONS RELATING TO CALCULATION OF THE EFFECTIVENESS INDICATORS OF
PLANNED CHEMICAL TECHNOLOGY SYSTEMS

Kiev KHIMICHESKAYA TAKHNOLOGIYA in Russian No 5, 1979 pp 40-41

STATYUKHA, G. A.

[Abstract] In planning complex chemical technology systems, effectiveness indicators are used, which help the planner to evaluate and select the optimal planning solution. The effectiveness indicators used are noise immunity, stability, quality of control, complexity, reliability, sensitivity, productivity, cost and a few others. Any effectiveness indicator, S , depends on technological parameters, α , effects of the environment, β , the design parameters of equipment, η , and structural parameters, γ . Thus, $S = S(\alpha, \beta, \eta, \gamma)$. Calculation of the effectiveness indicator vector with a computer requires running through a fairly complicated algorithm and processing a great amount of information, and some indicators require the introduction of special mathematical models for estimating them. Reliability is one of these. Aspects are discussed of the scientifically substantiated selection of the most representative indicators and of their inclusion in a model of the planning process for the purpose of making the optimal planning decision. In discussing the selection of the effectiveness indicators for a complex chemical technology system it is shown that it is not necessary to calculate and estimate the noise, or interference, immunity of the system. The planning of technological systems relies on the assumption that the complex's operation will take place with insignificant interference on the part of raw material flows and the environment. By the stability of the system is meant its ability to maintain its required properties under the effect of disturbances. The main problem for the system here is the existence of essentially nonlinear elements. An estimate must be made of stability when the system contains elements which are unstable by their very nature and when there are recycling processes in the system with essentially nonlinear elements. Otherwise stability, along with the quality of control, can be disregarded. A calculation is not made of complexity if the number of elements of the same type in the system is not greater than 10 and the total number of units is not greater than a few dozen. Therefore, for the majority of systems planned a determination is made of the following effectiveness indicators: sensitivity, λ , reliability, q , productivity, G , and technical and economic indicators, mainly, the system's cost, C ; $S = \{\lambda, q, G, C\}$. The application of these effectiveness indicators in the planning process is discussed. It is possible to produce a definite estimate of the effectiveness of a technological complex only at the stage of its operation. At the planning stage, the indicator of the forecastable effectiveness of a system is the probability that the planned system will maintain its effectiveness at the stage of operation. This indicator, κ , can be calculated from expert evaluations, $\kappa = p^T S$, $\sum p_i = 1$, where p^T is the vector of the weights

attached by experts to particular effectiveness indicators. At the stage of synthesizing a chemical technology system all effective indicators can be employed; it is possible to estimate the sensitivity of a system to a change in its parameters and raw material flows, and to estimate the system's reliability and its cost, with its productivity already predetermined. Then S_{KhTS} [chemical technology system] = $\{\lambda_{KhTS}, q_{KhTS}, G_{KhTS}, C_{KhTS}\}$. The effectiveness indicators discussed here can be used in organizing and controlling research processes and in planning complex chemical technology systems.

[41-11,176]

USSR

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PREPARATIVE BIOSYNTHESIS OF GROUP E AND GROUP F PROSTAGLANDINS BY THE
USE OF SYNTHETASE AS AN ACETONE-PENTANE POWDER

Tallin IZVESTIYA AKADEMII NAUK ESTONSKIY SSR - KHIMIYA in Russian,
Vol 28 No 3, 1979, pp 145-150, manuscript received 23 Nov 78

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[Abstract] Biochemical methods of synthesis of prostaglandins, which are relatively unstable optically active compounds, have advantages over chemical synthesis in certain cases, since they are simple and minimize the formation of side products. This article presents results from the first stage of work on preparative synthesis of prostaglandins by a biochemical method. The true equilibrium and kinetic parameters of the formation of prostaglandins under the conditions used are not known; however, the apparent values of inactivation rate constant and catalytic constant of synthetase are sufficient to estimate the expected maximum yield of the products of the reaction of oxidative cyclization of polyenic acid. Under ideal conditions, most of the product is formed in the first stage of synthesis. The spectral and biologic characteristics indicate sufficient purity and high activity of the E₂ and F₂ prostaglandins synthesized. Figures 6, References 11: 1 Russian, 10 Western. [60-6508]

UNIFIED AGRICULTURAL CHEMIZATION SERVICE CREATED

Moscow SEL'SKAYA ZHIZN' in Russian 2 Sep 79 p 1

[Article: "Unified Chemization Service"]

[Text] The flow to the countryside of mineral fertilizers, different chemical agents for protecting plants and animals from diseases and pests, lime and gypsum-containing materials, fodder supplements and other products of chemistry is increasing from year to year. As a result the collective and state farms are receiving a powerful means of control over further intensification of agricultural production and increase in field and farm productivity. But in order for this means of control to operate at full force, the increased arsenal of agents for chemization of production must be skillfully applied, and problems must be solved in all their complexity. Unfortunately, these agents are still not being used correctly and rationally everywhere nor is the due yield being obtained from them.

In order to introduce proper order in the work of the chemization of agriculture, the CPSU Central Committee and the Soviet government have enacted a decree "On the Creation of a Unified Specialized Agrochemical Service in the Country." This decree, published a few days ago in the press, recognized the necessity of organizing an All-Union Production-Scientific Association for Agrochemical Service to Agriculture (Soyuzsel'khozkhimiya) within the system of the USSR Ministry of Agriculture. The association is being created on the basis of the subdivisions of the USSR Ministry of Agriculture and the USSR State Committee on Agricultural Technology dealing with problems of the chemization of agricultural production. In the unified system of agrochemical service the formation of self-supporting production-scientific associations in the union republics, production associations in the autonomous republics, krays, oblasts and rayons and chemization stations on farms is envisaged. Agrochemical laboratories, plant protection stations and scientific research institutions also enter into its composition.

This system is being called upon to ensure scientifically valid use of mineral and organic fertilizers, chemical and biological plant protective agents, soil improvement agents, fodder supplements, growth stimulants and other agricultural chemization agents on all collective farms, state

farms and at other agricultural enterprises; to organize the extraction of peat and local lime and gypsum-containing materials; to perform all basic work on increasing the fertility of soils, improving them chemically and treating crops with chemical and biological plant protective agents under contracts with the farms; to develop an agrochemical service network and to strengthen its material and technical base. The Soyuzsel'khozkhimiya Association is also obligated to conduct control over the quality and timely delivery to agriculture of chemization agents, reliable accounting and reporting on their use at all agricultural enterprises and also over the observance by all land-users of measures for protecting the environment from pollution by pesticides and fertilizers and over the organization of the training and retraining of the specialists and personnel of mass professions in the chemization of agriculture and in plant protection.

Taking into consideration the exceptionally important significance of chemization to the further development of agricultural production, the CPSU Central Committee and the USSR Council of Ministers made it incumbent upon the Central Committees of the Communist Party and the councils of ministers of the union republics to ensure the organized implementation of all measures related to the creation of the unified agrochemical service, the transfer of the necessary material and technical base, warehousing capacity, cultural and living accommodations and available housing to the new organs. Particular attention must be given to the selection of, and rapid staffing of all units of the service with, highly qualified personnel capable of successfully conducting the complex work of the chemization of agriculture on a scientific basis and of increasing its effectiveness.

In some oblasts and autonomous republics production or production-scientific agrochemical associations have been operating for several years. The experience of their work should be used as widely as possible. For example, the production-scientific agrochemical associations in Mariyskaya ASSR, Moscow Oblast and several other oblasts are doing successful work. Thus, the Moscow Oblast agrochemical association has service 400 farms of the oblast with a total area of farm land of 1.7 million hectares. It is independently conducting a whole volume of work on liming acid soils, almost half the volume of work on eliminating organic and introducing mineral fertilizers and more than 55 percent of work on chemical plant protection. Thanks to the increased scale of chemization of production and the rational use of fertilizers and the increase in agricultural crops, the farms of the oblast have increased the average annual yield of grain more than two-fold. Many farms and even rayons are harvesting 40-50 or more centners of grain, 250-300 centners of potatoes and 100-120 centners of straw from a hectare of plantings.

Rural workers are now engaged in harvesting the crops and are simultaneously laying down the basis for next year, which concludes the 10th Five-Year Plan. It is a matter of honor for the workers of the agrochemical service to render effective assistance to the collective and state farms so that organic and mineral fertilizers may be accumulated and applied to the fields in the necessary proportions, to teach the machine operators and

all agriculturalists progressive techniques for using chemical agents. The autumn must be used to expand work on the liming of acid soils maximally, especially in the zone poor in chernozem.

Success in the agrochemical service's work and the effectiveness of chemization to no small extent also depend on the workers of the chemical and other branches of industry which supply agriculture with fertilizers, technology, materials and equipment. They are urged to increase production more rapidly and to increase the quality of fertilizers, herbicides, various preparations, techniques and equipment for mixing fertilizers, transporting them and applying them to the soil.

Rational use of the increased flow to the countryside of agents for the chemization of agriculture will undoubtedly ensure further increase in field productivity, the production of the products of agriculture and live-stock raising and more complete satisfaction of our country's requirements for them.

[67-9380]

9380

CSO: 1841

USSR

UDC 661.634.2+631.893

STUDY OF THE PRODUCTION OF PHOSPHORIC ACID AND COMPLEX FERTILIZERS FROM
PHOSPHORITES OF THE ASERI DEPOSITS

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR - KHIMIYA in Russian Vol 28
No 3, 1979 pp 204-209 manuscript received 10 Nov 78

AASAMAE, E., VEIDERMA, M., REBANĖ, Anne

[Abstract] Results are presented from studies of the process of sulfuric-acid abstraction of phosphoric acid from Aseri phosphorites and processing of the extracts produced into ammophos and nitroammophos. A cyclical method was used to imitate the continuous process of production of extracts, with triple washing of phosphogypsum. Extraction was usually performed at 75 C, although 90 C was also used in two experiments. The results showed that the best specimens of Aseri concentrates can be used to produce ammophos and nitroammophos, the results depending on the content of magnesium and iron in the raw material. Since the iron concentration is basically uniform, the acceptance criterion for raw material can be formulated as $MgO:P_2O_5 \leq 10-13:100$. Figure 1, References 4 Russian. [60-6508]

USSR

UDC 631.84:633.11:(470.45)

THE EFFECT OF NITROGEN FERTILIZERS ON THE YIELD AND QUALITY OF WINTER
WHEAT IN THE SOUTHERN CHERNOZEM ZONE OF VOLGOGRADSKAYA OBLAST

Moscow AGROKHIMIYA in Russian No 8, Aug 79 pp 3-8 manuscript received
6 Jun 78

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[Abstract] The effect of periods, methods of application and forms of nitrogen fertilizers on the yield and quality of winter wheat was studied during 1974-1976 at the Volga Area Plant Breeding Experimental Station of the All-Union Scientific Research Institute of Corn, located in Uryupinskiy Rayon of Volgogradskaya Oblast under unirrigated conditions. The field experiments were set up on plots of the Agrotechnics and Seed Growing Laboratory of Grain Crops in a six-fold crop rotation of bare fallow, winter wheat and corn for spring wheat, peas and barley. The frequency was threefold, the calculated area of the plots was 100 m² and the variety was Mironovskaya yubileynaya 50. The cultivation techniques of the winter wheat were those generally used for the zone. Fall

plowing to a depth of 25-27 cm was carried out after harvesting the barley. The soil was then left bare fallow. Mineral fertilizers at the rate of 3 qt/ha of P_{sg} (P60) and 2.5 qt/ha of N_{aa} (N85) were applied as a general background as preplanting cultivation. The wheat was sown during the optimum period of 28 to 31 August. The soil of the experimental plot was low-humus average loamy Chernozem with humus level of 32-45 cm, clod layer depth of 10-16 cm, depth of tilling in the carbonates of 50-60 cm and an underlying layer of carbonaceous loam with soil-forming rock of light gray sandy loam changing to sand. The soil of the clod layer had various agrochemical indicators of humus, total nitrogen, easily hydrolyzed nitrogen, nitrate nitrogen and various phosphorous and potassium compositions. The soil was regarded as being well supplied with potassium and available phosphorus and medium supplied with nitrogen. The nitrogen availability was a function of moisture provision to the soil. Nitrogen top dressings were studied on a background of N85P60. Ammonium nitrate and urea were applied superficially early in the spring on raw soil at the rates of 2.7 qt/ha and 1 qt/ha, respectively. The roots of the winter wheat were top dressed with a 30 percent urea solution (1 qt/ha per 233 liters of water) during the heading phase. The grain was harvested by direct combining. The experimental results were processed mathematically by using Dospekhov's dispersion analysis. The total nitrogen content in the winter wheat was determined according to Kjeldahl, protein content was determined by recalculation to coefficient 5.7, gluten content was determined by the washing method, the strength of the flour was determined on an alveograph and the volume of the bread was determined from 100 grams of flour. The temperature conditions during the experiments were close to normal in 1974, slightly above normal in 1975 and slightly below normal in 1976; 1976 had the best weather conditions for growth and development of the winter wheat and grain formation with precipitation of 485 mm, of which 59 percent of the total amount fell during the period from April through August. The experiments showed that additional application of nitrogen fertilizers by early spring or non-root top dressing had no positive effect on the winter wheat yield, the grain unit and the weight of 1,000 grains. Nitrogen top dressings do increase the protein content and vitreousness of the grain and also the raw gluten content. Application of nitrogen in early spring and during the ear formation phase ensures a higher increase of gluten. Application of urea during spring top dressing one time with fertilizer application before planting is also effective in improving the quality of the grain. One-time application of urea in the spring after application of a nitrogen-phosphorus fertilizer prior to sowing also provides the highest net income from the grain. References 21: 20 Russian, 1 Ukrainian. [47-6521]

USSR

THE EFFECT OF SYSTEMATIC APPLICATION OF FERTILIZERS ON THE AGROCHEMICAL INDICATORS OF THE FERTILITY OF LEACHED CHERNOZEM AND THE YIELD OF CORN WITH PERMANENT CULTIVATION OF IT

Moscow AGROKHIMIYA in Russian No 8, Aug 79 pp 39-45 manuscript received 18 Apr 78

GETMANETS, A. YA., KUZ'MINA, A. P., STULIN, A. F., YES'KOV, V. A. and SAVVINA, M. S., All-Union Scientific Research Institute of Corn, Dnepropetrovsk, and the Voronezh Experiment Station of the Scientific Research Institute of Corn

[Abstract] The effect of the types and doses of mineral fertilizers during systematic application of them on the dynamics of the main nutrients in the soil, feeding and productivity of plants and the extent of the loss of the main nutrient elements by the yield of corn during permanent cultivation was studied in a prolonged field experiment at the Voronezh Experiment Station of the Scientific Research Institute of Corn. The corn was cultivated permanently from 1961 with a break of permanence in 1969-1970. Fertilizers were applied to the plowed ground in the fall of 1966 in the form of N_{aa} , P_{sg} , and K_{kh} . The planted area was 269.5 m² and the area taken into account was 192.5 m² with three-time repetition. Corn hybrid VIR 25 was planted prior to 1969 and Dneprovskiy 247 MV was planted since 1971. The agricultural practices of corn cultivation for silage were the same as generally adopted in the central Chernozem zone of the RSFSR. The soil of the experimental plot was leached chernozem containing 5.7 and 5.0 percent, respectively, humus in the plowed and subsoil layers. The total nitrogen content was 0.28 and 0.25 percent, phosphorus content was 0.18 and 0.15 percent, potassium content was 1.88 and 2.09 percent, easily hydrolyzed nitrogen was 59 and 49 milligrams, available potassium was 120 and 100 milligrams, exchangeable potassium was 219 and 200 mg/kg of soil and the pH was 5.6 and 5.7. Soil sampling was taken from the plowed layer at five locations of the plot during the three repetitions of the experiment over five periods. The nitrate nitrogen, available phosphates and exchangeable potassium were determined. Plant samples were selected and prepared for chemical analysis by the generally accepted method. The nitrogen, phosphorus and potassium content were determined in the plant specimens by the Kjeldahl, photocolometrically and on a flame photometer, respectively. The yield data were processed mathematically by the dispersion analysis method. Precipitation during the experiment varied from 89.6 mm in 1972 to 309.0 mm in 1976 with an average of 231.3 mm over the period of the experiment. The agrochemical properties of the leached chernozem showed a positive increase of practically all soil fertility indicators with systematic nitrogen application. Mineral fertilizers also increased the exchangeable potassium content in the soil by an average of 13-26 percent compared to the control, although

the exchangeable potassium content did decrease toward the blooming-milky wax ripeness stage of the grain. Nutrient substances in the corn and the accumulation of dry matter were both increased as a result of mineral fertilizer application. The application of nitrogen fertilizer caused the greatest increase, while potassium caused a lower increase and phosphorus even lower. Fertilizer application at the rate of 120 kg/ha has the best effect on the nitrogen and potassium balance, while phosphorus application at the rate of 30 kg/ha significantly enriches the soil with this element. The optimum dosage of mineral fertilizers is N60-90P30K60 when growing corn on leached chernozems on a permanent basis. References 17: 16 Russian, 1 Ukrainian.
[47-6521]

USSR

UDC 632.954

THE MAIN KINETIC CHARACTERISTICS OF THE TOTAL PROCESS OF PIKLORAM
DECOMPOSITION IN THE SOIL

Moscow AGROKHIMIYA in Russian No 8, Aug 79 pp 112-116 manuscript received
21 Aug 78

SPIRIDONOV, YU. YA., MAKEYEVA-GUR'YANOVA, L. T., SHESTAKOV, V. G., SHABAONV, A. K., and BONDAREV, V. S., All-Union Scientific Research Institute of Phytopathology, Moskovskaya Oblast

[Abstract] The main kinetic principles of the total decomposition of pikloram in the soil was studied and the rate constants and activation energy of the process were determined to analyze the possible methods of pikloram decomposition in the soil. Previous experimental data on degradation of the herbicide in soddy-podzolic soil with permanent moisture content of 60 percent of the total moisture capacity and at temperatures of 5, 22 and 35°C were used to calculate the main kinetic characteristics of the total decomposition process. Linear regression equations were used to calculate the degradation process of pikloram in the soil and the activation energy and rate constants. The total activation energy of the observed total decomposition process of pikloram in the soil under the approximated natural field conditions was expressed with a low value of 5.5 kcal/g per mole. This low value can be explained by the clearly marked catalytic process of pikloram breakdown in the soil due to the activity of biological catalysts of microbial origin. Figures 3.
[47-6521]

PRODUCTION OF CHLORINE-FREE AND SULFUR-FREE N-P-K FERTILIZERS IN THE NITRIC ACID TREATMENT OF AN APATITE CONCENTRATE

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 5, 1979 pp 3-4 manuscript received 16 Nov 77

GOLUB, A. M., MULYARCHUK, I. F., FILIPPOVA, F. I. and GORDIYENKO, V. M., Kiev State University

[Abstract] A description is given of a method for the thorough nitric acid treatment of an apatite concentrate, whereby chlorine-free and sulfur-free N-P-K fertilizers are produced, by utilizing potassium sulfate or potassium carbonate. The potassium sulfate is used simultaneously to extract gypsum. With a potassium sulfate pulp about 97 percent of the calcium is precipitated in the form of gypsum, a process which takes three or four hours at 60°C, resulting in crystals measuring 200 to 400 μ , without the formation of disulfates along with the calcium. The gypsum extracted is close to a chemically pure substance. By this method for the first time homogeneous melts of an N-P-K mixture are produced directly in the evaporator. Anhydrous, homogeneous mobile melts are produced at 186°C in the evaporator without solid precipitates. A mixture of NH_4NO_3 , KNO_3 , $\text{NH}_2\text{H}_2\text{PO}_4$ and H_2O is obtained after extraction of the gypsum and neutralization of the extract. By introducing a step-by-step evaporation process it is possible to bypass the crystallization region in the 120° to 165°C range and thus avoid the precipitation of solids. Another advantage of the method is that it incorporates the process of monodisperse granulation of the melt in a tower, a process developed at the Ukrainian SSR Academy of Sciences Institute of Technical Thermophysics. By this process granules of a strictly definite size are produced. The granules produced are distinguished by good physical properties, do not cake and are threefold better than existing nitrophosphate fertilizers in terms of strength, and 2.5-fold in terms of stability in water. With a ratio of N:P:K = 1:0.7:1 the total content of nutrients in the fertilizer is 53.5 percent. When potash is used the additional advantage is gained of producing calcium carbonate as chemically precipitated chalk, which is a scarce product and is used as a filler in plastic, rubber, paper and paint and varnish products. The potassium sulfate produced in the conversion process is recycled for the purpose of precipitating gypsum, so that sulfate ions are recycled in extracting the calcium in the form of gypsum and the problem of sulfur, sulfuric acid and sulfates is solved. In addition, the process has demonstrated the vast potential of an apatite concentrate as a raw material for producing strontium, fluorine and rare earth elements. This method is better in many respects than existing foreign methods of treating phosphates with nitric acid. Figures 1; references 8: 7 Russian, 1 Western. [41-11,176]

USSR

UDC 547.26'118

ACIDIC PROPERTIES AND REACTIVITY OF CYCLIC THIOPHOSPHOROUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1623-1697 manuscript received 10 May 78

OVCHINNIKOV, V. V., GALKIN, V. I., CHERKASOV, R. A. and PUDOVIK, A. N.,
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] The authors have been investigating the chemistry of cyclic acid phosphites--structure, ionization constant, tautomerism and reactivity--and have extended these studies to sulfur analogs of those compounds. Specifically, the present study is to define the influence of substitution of an oxygen atom in the phosphoryl group by a sulfur atom. Ovchinnikov et al., (1978) had shown the formation of i) a tautomeric structure or ii) a protonized phosphite form, as characteristic of phospholane derivatives of cyclophosphorous acids. It is now shown that reaction of thionecyclophosphites with elementary sulfur can produce 0,0-alkylenedithiophosphoric acids. Ionization constants of the latter, and their capacity to react with sulfur support the displacement of the phosphonate-phosphite to the acid form. Tautomers of 2,3-butylenethiophosphonic acid derivatives--which vary with respect to acidity--can be present in aqueous alcohol solution, apparently due to the acceptor capacity of a dioxaphospholane substitution on the phosphorus atom. Identification of structures synthesized has been made by IR and NMR spectroscopy. Figures 1; references 10: 8 Russian, 2 Western (one is a US patent). [26-8586]

USSR

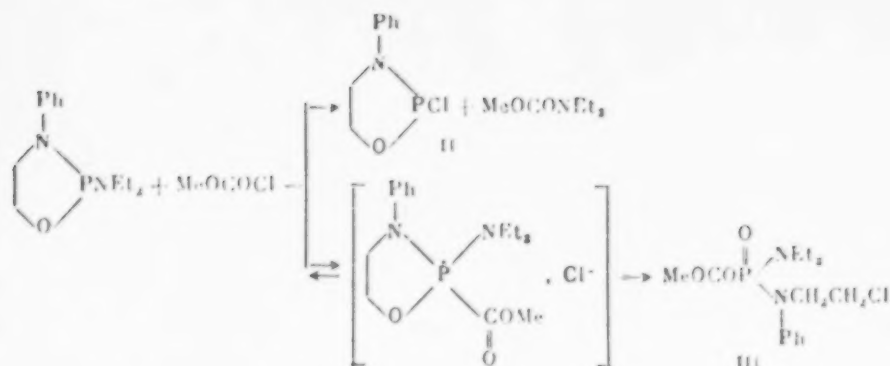
UDC 547.794.2.118

REACTION OF 2-DIETHYLAMINO-3-PHENYL-1,3,2-OXAZAPHOSPHOLANE WITH ACYL HALIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1698-1705 manuscript received 31 Oct 78

PUDOVIK, M. A., KIBARDINA, L. K., BATYYEVA, E. S. and PUDOVIK, A. N.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbusov, Kazan
Filial, USSR Academy of Sciences

[Abstract] 2-Diethylamino-3-phenyl-1,3,2-oxazaphospholane was reacted with several acyl halides of carboxylic acids (CH_3COCl ; $\text{C}_6\text{H}_5\text{COCl}$; CH_3OCOCl ; CH_3COBr and $\text{C}_6\text{H}_5\text{COBr}$). The reaction with CH_3OCOCl is shown to occur as follows:



Actual features of the reaction have been found to be governed by the acyl halide used, the solvent (presence of, nature, or absence of), acidic additives and temperature of reaction. Acid catalysis takes place with initial protonization by the free halogen hydride admixed with the acyl halide. It is also seen that the bromine atom of 2-Br-1,3,2-dioxaphospholanes can be replaced by a chlorine atom when those compounds are reacted with triethylamine hydrochloride. References 13: 9 Russian, 4 Western.
[26-8586]

USSR

UDC 547.26'118

REACTION OF AMIDES AND ESTERS OF TRIVALENT PHOSPHORUS ACIDS WITH NITRILES OF AMINOKETOCARBOXYLIC ACIDS

Leningrad ZHURAAK OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1705-1712 manuscript received 14 Apr 78

KONOVALOVA, I. V., YUDINA, R. V., MIKHAYLOV, YU. B., OFITSEROVA, E. KH and PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] This article reports results of study of the reaction of 0,0-dimethyl-N,N-dimethylamidophosphite with nitrites of benzoylformic (I), pyruvic (II) and trimethylpyruvic (III) acids. Reaction with I yields a 5-coordinated phosphorus atom; with II, 0-methyl-N,N-dimethyl (alpha-cyanoethyl) phosphate; with III, an oxidation product plus 1,2-di-tert-butyl-1,2-dicyanoethylene. Amides and esters of 3-coordinated phosphorus acids play the role of catalysts in the trimerization of III to yield 2,4,6-trispiroaloyl-1,3,5-triazine. Triethylphosphite and III react to form a trimerization product and diethyl (alpha-cyano-beta, beta-dimethyl-vinyl)phosphate. Reactions cited are illustrated by equations. References 22: 13 Russian, 9 Western.
[26-8586]

MONOXIDES OF DIAMIDODIALKYLDIPHOSPHINES AND THEIR ISOMERIC ANHYDRIDES.
REARRANGEMENT IN A SERIES OF THESE COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1712-1724 manuscript received 10 Jul 78

FOSS, V. L., LUKASHEV, N. V., VEYTS, YU. A. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] The authors' laboratory had earlier shown (1973, 1977) that monoxide unsymmetrical alkylalkoxydiphosphines occur as three isomers, the most stable of which is the compound $R_2P-P(O)(OR')_2$. If the great thermodynamic stability of that isomer is due to the mesomeric donor capacity of the alkoxygroups, analogously structured isomers with dialkyl-amino groups will rearrange in the same direction: $R_2P(O)-P(NR'_2)_2$, compound I, to $R_2P-O-P(NR_2)_2$, compound II, to $R_2P-P(O)(NR'_2)_2$, compound III. Compounds I, II and III were synthesized to test this hypothesis. Synthesis is described for various I, II and III compounds with different R and R' residues, and their chemical and physical properties are listed. Compounds of I were found to be more stable than the alkoxy analogs even though rearrangement of the two types was the same. Reaction conditions are discussed. References 9: 6 Russian, 3 Western (two by Foss, et al.). [26-8586]

MONOXIDES OF STERICALLY-HINDERED SYMMETRICAL TETRAALKYLDIPHOSPHINES.
PHOSPHOROTROPIC EQUILIBRIUM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1724-1729 manuscript received 17 Jul 78

FOSS, V. L., SOLODENKO, V. A., VEYTS, YU. A. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Foss, et al., showed earlier (1976) that in phosphinic acid anhydrides, the increase in volume size of the radicals attached to the phosphorus atom is one of the reasons for their increased relative stability, as compared with isomeric monoxides. This article reports synthesis of a series of monoxides of tetraalkyldiphosphines with the general formula I (wherein the oxygen is attached to one phosphorus atom by a double bond) to study their ability to isomerize into anhydrides, formula II, (wherein the oxygen atom joins the two phosphorus atoms, P-O-P. The series prepared with formulas I and II had R as tertiary-butyl, isopropyl, isobutyl, butyl and phenyl. The spectrally-determined field of existence of stable

anhydrides of the dialkylphosphinic acids was limited to those compounds in which two tertiary or one tertiary plus one secondary radical were bound to the phosphorus. The thermodynamic functions of isomerization of the monoxides into the anhydrides were studied to elucidate the nature of the steric hindrance. References 13: 6 Russian, 7 Western (two by Foss, et al.).
[26-8586]

USSR

UDC 547.241+547.245

REACTION OF HEXAMETHYLDISYLTIAN WITH HALIDE ANHYDRIDES OF PHOSPHORUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1730-1731 manuscript received 21 Jul 78

LEBEDEV, YE. P., MIZHIRITSKIY, M. D., BABURINA, V. A. and OFITSEROV, YE. N., Kazan Filial, All-Union Scientific Research Institute of Synthetic Caoutchouc imeni S. V. Lebedev

[Abstract] Note is made of the lack of literature references to the title reaction type. This article reports a study of the reaction of hexamethyldisyltitan with oxychlorides of acids of P^{III} and P^V with the structure of $(RO)_2PCl$, where $R=Me, Et, NMe_2$; and the structure of $(RO)_2P(O)Cl$, where $R=Me, Et, Pr$ or Bu . The oxychlorides of P^V acids reacted like the oxyhalides of carboxylic acids. Trimethylhalogenoxylenes and trimethylsilyldialkylthionephosphates were formed (when the ratio of the starting reagents was 1:1); non-symmetrical tetraalkylmonothiopyrophosphates were formed (when the ratio was 1:2). The oxychlorides of P^{III} acids formed tetraalkylmonothiopyrophosphites. References 7 (Western).
[26-8586]

USSR

UDC 547.26'118+547.245

REACTION OF HEXAMETHYLDISYLTIAN WITH DIALKYL ESTERS OF ALPHA-HYDROXYALKYL (BENZYL)PHOSPHONIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1731-1737 manuscript received 3 Jul 78

LEBEDEV, YE. P., MIZHIRITSKIY, M. D., BABURINA, V. A., MIRONOV, V. F. and OFITSEROV, YE. N., Kazan Filial, All-Union Scientific Research Institute of Synthetic Caoutchouc imeni S. V. Lebedev

[Abstract] This is an extension of ongoing studies of the reaction of alcoholysis of organosyltitan (authors' laboratory, 1976, 1977). In the present article work is reported on the reaction of hexamethyldisyltitan (I)

with several dialkyl esters of the title acids II with the general structure $(R^1O)_2P(O)CR^2R^3(OH)$ where R^1 is Me, Et; R^2 is H, Me; R^3 is Me, Et, Ph. I reacted with II to give a high yield of O,O-dialkyl- α -trimethyl-siloxyalkyl(benzyl)phosphonate, III. The reaction rate appeared to be a function of the acidity of the proton of the hydroxyl group. Course patterns of this reaction type resembled the patterns of reactions of organosilyl compounds with proton-donor reagents. III phosphonates readily react with proton-donor reagents and acid oxyhalides with rupture of the Si-O bond. Figure 1; references 12: 11 Russian, 1 Czech. [26-8586]

USSR

UDC 541.6:547.1.118

PHOTOELECTRONIC SPECTRUM AND ELECTRONIC STRUCTURE OF VINYL DICHLOROPHOSPHONATE $Cl_2P(O)CH=CH_2$

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1737-1745 manuscript received 17 Jul 78

ZVEREV, V. V., VILLEM, YA. YA., ISLAMOV, R. G. and KITAYEV, YU. P., Institute of Organic and Physical Chemistry imeni A. Ye. Arbusov, Kazan Filial, Academy of Sciences; Tartu State University

[Abstract] The title compound (I) exhibits properties of two classes of compounds, as a coordinated P atom compound and as a representative of the $XCH=CH_2$ substituted ethylenes. The present article is a detailed report of an extension of photoelectronic studies (PES) on a series of 4-coordinated P compounds (Zverev, et al., 1975 to 1978). The PES and quantum chemistry were used to examine the structure of I. The ionization potentials of high occupied orbitals of functional groups were studied for $Cl_2P(O)X$; HX ; and $(EtO)_2P(O)X$; the $Cl_2P(O)$ group stabilizes the frontal orbitals of the double bond at 1eV; the activities of the $(EtO)_2P(O)$ and H groups are approximately equal. References 28: 20 Russian, 8 Western. [26-8586]

USSR

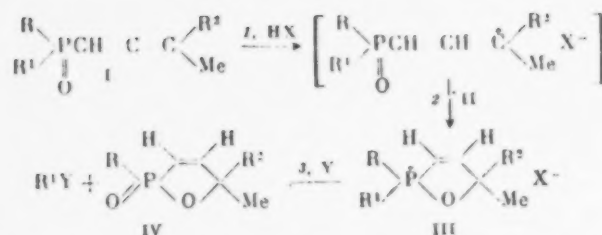
UDC 547.341

CYCLIZATION OF ORGANOPHOSPHORUS ALLENES IN ACID MEDIA

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1752-1756 manuscript received 16 Nov 78

MIKHAYLOVA, T. S., CHUNIN, YE. D., SKVORTSOV, N. K., IGNAT'YEV, V. M. and IONIN, B. I., Leningrad Technological Institute imeni Lensovet

[Abstract] The title cyclization is pictured as follows (based on available data:



Ia, R = R¹ = R² = Me; Ib, R = Ph, R¹ = OMe, R² = Me; Ic, R = R¹ = OMe, R² = Me; Id, R = R¹ = OMe, R² = Et; X = Cl⁻, HSO₄⁻, CF₃COO⁻; Y = Cl⁻, HSO₄⁻, CF₃COO⁻, OH⁻, H₂O.

Based on kinetic measurements, the mechanism in acid media involves a slow transfer of a proton to the central carbon atom of the allene system followed by a rapid attack of the carboxyl ion by the internal nucleophilic-oxygen of the phosphoryl group and by formation of a cyclic quasiphosphone salt. The dependence of the rate of reaction on the acidity function of the media and on the parameters of activation indicate the substantial orderliness of the transfer condition of the reaction. Protonization of the phosphoryl group causes a slowdown in the reaction rate as a consequence of destabilization of the carboxylic ion. The quasiphosphone salts are stable in media with low nucleophilic character but are rapidly converted into hydroxyphospholenes under the action of active nucleophilic agents. Figures 2; references 9: 5 Russian, 4 Western. [26-8586]

USSR

UDC 541.57:546.18:546.17:542.938

INTRAMOLECULAR INFLUENCE OF THE CARBOXYL GROUP ON THE DIRECTION OF HYDROLYSIS OF AMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1756-1763 manuscript received 11 Sep 78

MUKHAMETOV, F. S., STEPASHKINA, L. V. and RIZPOLOZHENSKIY, N. I., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Filial, USSR Academy of Sciences

[Abstract] This is a continuation of earlier research on the unique chemical behavior of amidophosphites which contain, as an ester radical, a beta-keto alcohol of (R₂N) (X) POC(R') (R'') CH₂ C(O) CH₃--compounds I. The present work is a study of the reaction of I with water, where acids (II) were expected which have a gamma-ketoalkyl radical. The authors suggested II as intermediates in the synthesis of 2-substituted hydroxyphospholane-3-oles (compounds III) from dichloroanhydrides of PIII acids and beta-ketoalcohols in the presence of bases, but could not isolate them. The reaction of I with water can be viewed as a model experiment in the synthesis of the intermediate products, II. Reactions of I with

water do not produce open-chain phosphorus acids with a gamma-ketoalkyl radical, but their cyclic isomer, viz., 2-substituted 2-hydroxy-1,2-hydroxyphospholan-3-oles. With dialkylamidoalkyl-alpha, alpha-dimethyl-gamma-keto-butylphosphites, the P-N bond is maintained. The behavior in the hydrolysis is attributed to an intramolecular reaction of the gamma-ketogroup with the phosphorus atom; this leads to a quasi-phosphone product and--due to change in direction from the reaction of replacement of the aminogroup--to the Arbuzov rearrangement reaction. References 8 (Russian; one multiple Russian reference cites a Western reference, Boisdon, et al., 1977). [26-8586]

USSR

UDC 547.26'118

PENTA(alpha, alpha, omega-TRIHYDROPOLYFLUOROALKOXY)PHOSPHORANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1764-1768 manuscript received 6 Dec 78

MARKOVSKIY, L. N., KOLESNIK, N. P. and SHERMOLOVICH, YU. G., Institute of Organic Chemistry, UkrSSR Academy of Sciences

[Abstract] Emphasis in this area of study has been the stability of products produced, with the help of insertion of electro-acceptor substituents into, e.g., acyclic phosphoranes. When tris (alpha, alpha, omega-trihdropolyfluoroalkyl)phosphites react with chlorine and bromine, dihalidephosphoranes (I) are formed which are stable at -40°C. When I react with aniline and alpha, alpha, omega-trihdropolyfluoroalkanoles there are formed phosphazobenzenes and the title compounds. The latter are stable to the action of organic acids and are unchanged when heated to 180°C, a property attributed to the polyfluoroalkoxyl groups. References 11: 3 Russian, 8 Western (one US patent). [26-8586]

USSR

UDC 547.26.118+547.476.1+547.281

REACTION OF AMIDOPHOSPHITES WITH MALONYL ESTER AND PARAFORM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1768-1772 manuscript received 25 Sep 78

IVANOV, B. YE., KUDRYAVTSEV, L. A., SAMURIN, S. V., AGEYEVA, A. B. and KARPOVA, T. I., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Filial, USSR Academy of Sciences

[Abstract] Condensation in a three-membered system, viz., malonyl ester-aldehyde-trialkylphosphites had been shown to produce esters of substituted

2,2-dicarboethoxyethylphosphonic acids (Ivanov, et al., 1969). This type of reaction has occupied the authors' attention; study was then made of the condensation in the system: malonyl ester--paraform-aminophosphites; in this reaction the malonyl ester was treated with amidophosphites which had OEt or NEt_2 substituents on the phosphorus atom (reaction 1). Condensation in the three membered system (malonyl ester-paraform-diethyl-amidodiethyl phosphite) formed the diethyl ester of 2,2-dicarboethoxyethylphosphonic acid (DCEEP) and a small amount of the divinyl ester of 2-2-carboethoxy-2-[carbo(N,N-diethylamido)] ethylphosphonic acid. DCEEP is produced from the reaction of the malonyl ester and paraform with triethylphosphite (formed in reaction 1) or with diethylamidoethylphosphite reaction in the three membered system. Additional products of these reactions are tabulated. Identity of products was assisted with IR and NMR spectroscopy. References 12: 11 Russian, 1 Western.
[26-8586]

USSR

UDC 547.341

ADDITION TO VINYLTHIOPHOSPHONATES OF ALCOHOLS, AMINES, DIALKYL(THIO)PHOSPHITES, HYDROSTANNANES AND STANNYLPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8, Aug 79 pp 1772-1777 manuscript received 18 Apr 78

BARGOV, F. V. and GALKINA, N. YE., Chuvash State University imeni I. N. Ul'yanov

[Abstract] Although detailed studies have been made of the addition reaction of nucleophilic reagents, containing a labile hydrogen atom, to alkenylphosphonates, reaction of nucleophilic reagents with alkenylthiophosphonates has not been studied. The present article described study of the reaction of alcohols (I), secondary amines (II), dimethylphosphite (III), dialkylthiophosphites (IV) and hydrostannanes (V) with esters of vinylthiophosphonic acid (VI). In this type of reaction compounds I, II and IV add to VI as a phosphonethylation; III compounds do not add, either in the presence of alcoholates or peroxides. The addition of V to VI can proceed to yield a beta isomer or alpha addition. The hydrostannylation is exothermic; ratio of products (identified by IR spectra) formed is a function of the size of the alkoxyl radical of VI. Figure 1; references 14 (Russian).
[26-8586]

USSR

UDC 547.88

AMINOLYSIS OF 2,2,4-TRICHLORO-1,3,5-TRIAZA-2-PHOSPHORINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1777-1782 manuscript received 29 Aug 78

KORNUA, P. P., KOLOTILO, N. V. and KALININ, V. N., Institute of Organic Chemistry, UkrSSR Academy of Sciences

[Abstract] Kornuta, et al., have shown earlier (1977, '78) that PCl_5 reacts with carboxylic acid N-cyanamidines to form 2,2,4-trichloro-1,3,5-triaza-2-phosphorines (II). In the present study, II was reacted with various amines. It was found that the chlorine atoms can be replaced by an aminogroup. The degree of replacement is a function of the ratio of reagents and the nature of the amine. Mono, di- and triamino-derivatives are formed; the derivatives synthesized are listed, with their PMR spectra data. References 3: 2 Russian, 1 Western. [26-8586]

USSR

UDC 547.241

PHOSPHAZO-BETAINES TAUTOMERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1782-1787 manuscript received 14 Aug 78

GUSAR', N. I., CHAUS, M. P. and GOLOBOV, YU. G., Institute of Organic Chemistry, UkrSSR Academy of Sciences

[Abstract] After having demonstrated (Gusar', et al., 1978) that tri-valent phosphorus compounds react with azidocarboxylic acids to form betaine--due to transfer of a proton of the COOH group, in the intermediary phosphazo compound, from the oxygen to the amino nitrogen--the author synthesized and studied similar betaines with an anion center on the N atom, analogous to amino acids, and with a potential biological action. The synthesis involved a prototropic shift. Starting materials for synthesis of such compounds included previously unknown N-(2-azidoethyl) amides of carboxylic and diethylphosphoric acids, which were prepared by reacting the corresponding N-(2-chloroethyl) amides with sodium azids in the presence of dimethylformamide. Staudinger reaction products were prepared with hexamethyltriamidophosphite; these compounds had a phosphazo structure, except for the trifluoroacetyl derivative which can exist both in a phosphazoform and in a betaine form, or in an equilibrium mixture of both forms. Figure 1; references 4: 2 Russian, 2 Western. [26-8586]

USSR

UDC 547.79+547.794.3

REACTION OF METHYL ESTERS OF 3-ACETYL- AND 3-PHENYLDITHIOCARBAZINIC ACIDS WITH PHOSPHOROUS OXYCHLORIDE, PHOSPHOROUS TRICHLORIDE AND THIOTRICHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1896-1901 manuscript received 24 Jul 78

SHVETSOV-SHILOVSKIY, N. I., NESTERENKO, D. P. and STEPANOVA, A. A., All-Union Scientific Research Institute of Chemical Plant-Protective Agents

[Abstract] The reaction of methyl esters of 3-acetyl and 3-phenyldithiocarbazine acids with PCl_3 produces 2-acetyl- or 2-phenyl-1-chloro-4-methylthio-1,2-dihydro-1,5,2,3-phosphathiadiazoles. The chlorine atom of the products--under the action of amines and alcohols in the presence of an HCl acceptor--is replaced by an OR" and NRR' group. Reactions of the methyl ester of 3-phenylthiocarbazine acid with POCl_3 and PSCl_3 yield phosphathiadiazoles; the methyl ester of the 3-acetyl analog reacts with POCl_3 and PSCl_3 to yield 2- CH_3 -5-methylthio-1,3,4-thiadiazole HCl. References 7: 1 Russian, 6 Western (one English and one French patent). [26-8586]

USSR

UDC 547.241.07(088.8)

PATHWAYS OF CONVERSION OF ALKYLPHOSPHONOUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1905-1906 manuscript received 24 Jan 79

NIFANTYEV, E. YE., SHCHEPET'YEVA, N. P. and MAGDEYEVA, R. K., Moscow State Pedagogy Institute imeni V. I. Lenin

[Abstract] Interest in the title compounds was precipitated by relative absence of reports on them. The authors' laboratory worked out (1978) synthesis of the compounds and undertook study of their properties. Hydrogen peroxide oxidation was found to yield a good return of alkylphosphonic acids, $\text{RP(O)H(OH)} + \text{H}_2\text{O}_2$ yielding RP(O)(OH)_2 . Chemical properties of the products (for various Rs, e.g., C_6H_{13}) are listed. Basic interest of the derivatives lies in their capacity to attach to sulfur to form thiophosphonic acids, RPO_2SH_2 . [26-8586]

USSR

UDC 547.241+547.841

TRIETHYLPHOSPHITE REACTION WITH 2-CHLORO-3-ACETOXY-1,4-DIOXANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1906-1907 manuscript received 2 Feb 79

TSIVUNIN, V. S., ZARIPOVA, V. G., ZYKOVA, T. V. and SALAKHUTDINOV, R. A., Kazan Chemical Engineering Institute imeni S. M. Kirov

[Abstract] Reference is made to earlier found (1979) reactions of 2-Cl-3-acetoxy-1, 4-dioxane (II). The present report outlines the reaction of II with triethylphosphite (I), a reaction which can proceed in two directions. The basic products (direction a) are diethylphosphorous acid (III) and (direction b) 2-CH₃-2 diethylphosphonyl-1,3,4,7-tetraoxahydrate (IV). Chemistry of the reactions indicate that the reaction center of II is the carboxyl carbon, but the difference in the nucleophilic nature of the diethylphosphite anion and the triethylphosphite causes formation of the different end products. References 2 (Russian). [26-8586]

USSR

UDC 547.26'118.241.624

TETRAALKOXYDIPHOSPHINES. STEREOCHEMISTRY OF THE ADDITION OF TETRAALKOXYDIPHOSPHINES TO ALKOXYACETYLENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1910-1911 manuscript received 23 Feb 79

PROSKURINA, M. V., KARLSTEDT, N. B. and LIVANTSOV, M. V., Moscow State University imeni M. V. Lomonosov

[Abstract] The authors have been intensively investigating the tetraalkoxydiphosphines (1973-1978). The title addition--which occurs readily at 0-10°--is illustrated, using, as an example, tetrabutoxyphosphine adding on alkoxy (or butoxy) acetylene. NMR spectra show the presence of 3-coordinated atoms of phosphorus in the attachment products. The addition, with respect to the triple bond of the alkoxyacetylenes, proceeds stereoselectively as a cis-addition; a radical mechanism for this conversion is apparently excluded by data indicating a molecular mechanism. References 3 (Russian). [26-8586]

ALLENE-DIENE ISOMERIZATION DURING ELECTROPHILIC REPLACEMENT OF THE ALKOXY GROUP IN 1-ALKOXY-3, 4-BUTADIENE-2-DIALKYLPHOSPHONATES

Leningrad zhURNAL OBSHCHEY KHIMII in Russian Vol 4 No 8 Aug 79 pp 1911-1912 manuscript received 26 Feb 79

BREL', V. K., SKVORTSOV, N. K., DOGADINA, A. V., IONIN, B. I. and PETROV, A. A., Leningrad Technological Institute imeni Lensovet

[Abstract] Brel', et al., had already established (1979) that nucleophilic replacement of the halogen in 1-chloro-2,3-butadiene-2-dialkylphosphonates (I) by an alkoxy group proceeds without isomerization, leading to esters of 1-alkoxy-2, 3-butadiene-2-phosphonic acids. In contrast, substitution of a methoxy group in I with a halogen is accompanied by an allene-diene isomerization with formation of esters of 3-halogen-1, 3-butadiene-2-phosphonic acids (II). The difference is attributed to the presence, simultaneously, in I on an electrophilic center of the digonal allene carbon and a nucleophilic center on the ether oxygen which promotes the course of a synchronic reaction with halogen hydrides. This reaction has been employed to synthesize 3-chloro-derivatives of phosphonoprenes and unstable 3-bromo-1, 3-butadiene-2-dialkylphosphonates. Reaction conditions are detailed. Reference 1 (Russian, viz., of Brel', et al.). [26-8586]

REACTION OF NITROETHANE WITH SEVERAL TRIVALENT ARSENIC ACID DERIVATIVES

Leningrad zhURNAL OBSHCHEY KHIMII in Russian Vol 49 No 8 Aug 79 pp 1916-1917 manuscript received 4 Dec 78

VALIULLINA, V. A., CHERNOKAL'SKIY, B. D. (deceased) and SHESTERNINA, T. A., Kazan Chemical Engineering Institute imeni S. M. Kirov

[Abstract] In the absence of reports on reactions of nitroalkanes with arsenous and arsenic acid compounds this Letter to the Editors relates a study of the reaction of nitroethane (NE) with ethylarsin oxide, bis (diethylarsine)oxide and the diethyl ester of ethylarsonium acid (III); under the conditions cited, the As-C bond is broken to yield arsenous oxide. The reaction of NE with III also yielded ethanol, ethyl acetate and nitroethane (11:2:1). The reaction products also contained other nitrogen and arsenic products not yet precisely defined. Identification of products used a Tesla B-487C NMR spectrometer. Reference 1 (Western). [26-8586]

DEVELOPMENT OF ULTRA-STRONG POLYMERS

Moscow KRASNAYA ZVEZDA in Russian 16 Oct 79 p 2

[Article by Academician V. Korshak and Doctor of Chemical Sciences Ye. Krongauz: "The Achievements of Science and Technology: Polymers, The Materials of the Century"]

[Text] "The production of synthetic materials with properties prescribed in advance may be singled out among the trends of scientific and technical progress playing a special role in the 10th Five-Year Plan and determining the prospects of the long-range development of the economic system."

These lines from "Basic Trends in the Development of the USSR National Economy in 1976-1980", enacted by the 25th CPSU Congress, are an indication of the enormous importance of chemistry to the further development of engineering, industry and the entire national economy, in the struggle for careful expenditure of funds and natural resources and in the perfection of technology.

But what new materials have appeared during the 10th Five-Year Plan? What new methods of improving the properties of polymers are being prepared today by science and practice? Academician V. Korshak and Doctor of Chemical Sciences Ye. Krongauz answer these questions.

You will remember that at the dawn of our country's industrialization a poet wrote, "Steel! More steel! Twice as much copper! Twice as much iron!" The exclamations were supposed to stress with particular force the importance of, and need for, metal. Decades have passed. Today more than three billion tons of metal have been reified on this planet--in machines, arms, means of transport, etc. And although steel remains as before the "bread of industry", an increasingly stronger position is

being won by its serious rivals--polymeric materials. And it is not just a question of steel. On the average, each ton of plastic now replaces 5-6 tons of ferrous and nonferrous metals, 2-2.5 tons of aluminum and rubber, 3-3.5 tons of timber... The substitution of plastic parts for metal ones makes it possible to save 10-30 percent of the weight of a construction.

The unusual combination of strength and light weight makes polymers particularly attractive as diversified construction materials, which are so essential to the national economy. Thus, for example, the polymers used in manufacturing automobile tires surpass aluminum and construction steel approximately two-fold in strength. Plastic reinforced with fiber glass for increased strength--the so-called fiber glass re-inforced plastics--have a density four times lesser than that of steel but approach it in strength. They also have diamagnetism, good heat-, sound- and electrical insulating properties, high corrosion and chemical resistance to sea water, solvents and other aggressive agents; this enables them to compete successfully with alloyed and high-strength steels....

"Polymers" is not simply a popular term designating one of a group of 20th century materials. It is an enormous branch of science and technology the achievements of which are widely used in all fields of human activity. These wonder materials are indispensable today in aviation and electrical engineering, in automobile- and ship-building, in construction and medicine, in agriculture and the production of products for national consumption.

And what of defense technology? Magazines for rifles, shoulder straps, triggers, gunstocks, handles, barrel plates and cases which burn up together with warheads can be made from polymeric materials. Bullet-proof glass--a triplex consisting of several layers of organic glass bonded together with layers of clear plastic--has been well known for a comparatively long time...

In a word, there is direct evidence of the merits of the polymers already in existence, and their potentialities are great. And at the same time, what has been accomplished can be figuratively called only the above-water part of the "iceberg of the attainable." However surprising it may seem, today's polymeric materials are offering only 10-15 percent of their ideal, that is, theoretically achievable strength, hardness, and other important characteristics.

This is occurring because the internal structure of these materials is a disordered, chaotic system with the microimperfections inherent to different types of such structures. If the internal structure of a polymeric specimen were successfully "corrected" by arranging the atoms in an orderly construction such as, for example, that of precious stones, then its strength and other properties would approach the ideal.

This, however, is associated with enormous difficulties in changing the basic macromolecular structure of polymers, which develops during their synthesis and reprocessing. These problems must be overcome; science is engaged in doing this.

The first step on the path to creating stronger polymers is obtaining compound materials reinforced with filamentous crystals. The major difficulty here is achieving sufficient length in these crystals. The use of monocrystalline filaments (graphite filament, tungsten, molybdenum and boron crystals) has already made it possible to obtain compound materials with an ultimate strength of as much as 500 kg/mm² or more, instead of 100 kg/mm² for ordinary fiber glass-plastics.

More and more polymers are appearing which have higher than usual heat-resistance, photosensitivity, electric conductivity, electric insulation, semi-conductor or physiologically active properties, opening new possibilities for the progress of different fields of modern technology. For example, while traditionally plastics were used in electric technology as insulating materials, recently so-called "metal-containing polymers", which conduct an electric current well and have a number of advantages over metals, have appeared.

The use of polymers as antifriction materials in bearings and other units with dry friction, rolling and slipping motion of different machines and devices is highly promising. In distinction from metal parts, they do not require lubrication, are capable of operating in a vacuum and at a great jump in temperature (from -200 to +300 degrees C), combining the properties of hard lubricants and construction materials.

The "Aman", "Tesan", "Esteran", "Vilan" and other brands of antifriction self-lubricating plastics (ASP-plastics) developed at the USSR Academy of Sciences Institute of Element-Organic Compounds have a set of needed properties--primarily heat-resistance and thermal stability, oil and gas resistance and resistance to radiation exposure and technological feasibility in processing.

The polymers referred to are the materials of the present day. Despite all the good qualities in them, we still have not succeeded in realizing all the theoretical possibilities, primarily strength. Ultrastrong polymers are the materials of the future, possibly of the near future, since an intensive search is being conducted in this direction. Modern equipment is enabling scientists not only to study the internal structure of polymers in greater depth but also to modify it in a purposeful way.

How is this accomplished?

In order to create a maximally strong polymer the macromolecular chains which in ordinary polymers are in the form of an intricate knot must be stretched out, oriented, placed upright and densely "packed". It is

well known that a high degree of orientation of molecular chains is noted in the natural fibers woven by, say, spiders and silkworms--although there are still many deviations even in these. But can such a high degree of orientation be achieved artificially?

Soviet scientists and their foreign counterparts are answering this question in the affirmative. Laboratory specimens of a high-strength oriented polyethylene the strength of which exceeds the strength of flexible steel wire 2.5-fold have already been obtained. Work has been begun with other, more heat-resistant polymers. Here it must be remembered that the existing technology makes it possible to give polymers strength in one direction only--lengthwise. The scientists' next problem is to achieve ultrastrength of polymer materials in other directions, that is, by means of biaxial stretching.

Another highly important aspect of this problem is giving ultrastrong polymer materials high thermic characteristics so that they rival metals not only in strength but also in heat resistance. Extensive research is being conducted in this direction with the chief objective of developing scientific bases for creating heat resistance and thermal stability of polymer structures.

On the basis of the theoretical premises obtained, work is already being conducted on the synthesis of processed polymers with a rigid structure which do not disintegrate below the melting point and which after processing and thermal treatment form three-dimensional ladder-like structures which ensure their high thermal stability. New polymers with unique properties have been obtained and are being investigated. First and foremost among them, we should mention the polymer "Kardis", first synthesized in our laboratory, which by its structure and physico-chemical properties occupies an intermediate position between graphite and diamonds.

The new ultrastrong polymers with high thermal stability--the second generation polymers--should not be viewed merely as substitutes for ordinary materials in customary, traditional use. They will give their own exploitation characteristics, and this in turn will mark a completely new approach to the solution of different scientific and technical problems and will further expand the horizons of our possibilities.

In the world today hundreds of thousands of researchers are working in the field of polymer science. Soviet scientists have made and are making an important contribution to its progress. The achievements of polymer science have enormous commercial and economic significance and are conducive to an increase in labor productivity and a rise in the prosperity of the Soviet people.

[69-9380]

9380

CSO: 1841

DEVELOPMENT OF POLYETHYLENE FILMS FOR AGRICULTURE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Oct 79 p 2

[Article by O. Berezhnaya: "Wonder Films"]

[Text] We are standing in the product showroom of the Plastic Scientific Production Association. Under the clear, spherical showcases are the association's products: plastic radio and television parts, the instrument panel of Zhiguli's; familiar packages and little cans with the inscriptions "sour cream", "cheese", "cottage cheese"--packages for dairy products; polyethylene film 40 times finer than a human hair; tubes half a meter in diameter and quite thin ones--for the cable industry.

And here are rolls of polyethylene film. On the signs I read, "Distinguished by increased transparency...", "has higher than usual heat resistance...". The use of these films in agriculture is securing a 1.5-2-fold rise in crop yields and early ripening of agricultural crops.

Later I met the creators of the films for the countryside: the laboratory supervisor, T. Itskova; the topic supervisor, Master of Chemical Sciences Ye. Samokhina; the senior scientific staff member, Master of Technical Sciences M. Morozova, and engineer V. Aver'yanova. Three years ago they began work on the creation of special agricultural films to replace conventional film, about which rural workers had made many complaints.

They began by testing colored films. Experiments indicated that certain varieties of lettuce grow better under blue film, and experimental groups of tomatoes gave a more abundant yield under orange. By varying the color and, at the same time, the lighting as well, it is possible to obtain remarkable results. Once they even "succeeded" in growing flowers... without petals. But such film was more suitable for scientific research--its "specialization" was too narrow for state and collective farms.

Foamed film proved to be much more effective. In hot weather it is cool in hothouses covered by such film, and the porous structure diffuses sunlight and protects plants from direct rays. On the other hand, at

night the temperature is 2-3 degrees higher under the film than in the open air. It also retains moisture. Its creators have received a silver and three bronze medals of the USSR VDNKh [Exhibition of the Achievements of the USSR National Economy"].

The chemists' next innovation looks unusual--a black film. As Ye. Samokhina explained to me, its purpose is not to transmit sun rays. The film is spread out directly on the ground and seedlings are transplanted in cuts. Weeds do not grow under it, and moisture does not evaporate. Consequently, the bed does not need to be either watered or weeded. It will have wide application in the planting of potatoes. The first prototypes of machines which will simultaneously spread film and transplant potatoes have been developed. The crop can be planted shallowly, and hilling is not necessary--the tubers will be reliably protected from the light.

And, of course, one of the latest works is photodisintegrating film. A graft is made on an apple tree and wrapped with film--and it is not necessary to remove the "bandage": it disintegrates by itself with time. And the film can be programmed for disintegration for any period of time: if necessary it will disintegrate in a month; if necessary, in half a year.

Ninety-five million rubles have been given to the government in the eight years of the association's development. Two hundred thirty inventors' certificates have been received; three licenses have been sold abroad; nine works have been patented abroad. Minute condensers, tubes, different parts.... And this remarkable film, which is helping to raise and preserve the harvest.
[69-9380]

9380

CSO: 1841

USSR

UDC 678.686]01:53

NEW CYCLOALIPHATIC EPOXY OLIGOMERS

Moscow PLASTICHESKIYE MASSY in Russian No 10, 1979, submitted 2 Jun 78
signed to press 25 Sep 79 pp 6-9

BATOG, A. YE., KOZLOVA, L. V., STEPKO, O. P. and DURMANENKO, N. A.

[Abstract] Some new cycloaliphatic epoxy oligomers containing an amide group were synthesized and described. Polymers based on these oligomers are heat resistant and thermostable with high physico-mechanical characteristics. These oligomers are recommended for use in developing heat resistant compounds, glues and bonding agents for reinforced plastic to be used at high temperatures. References: 6; Figures: 2.
[72-2791]

USSR

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POLYMER MATERIALS BASED ON ALICYCLIC TRIEPOXIDES AND TETRAEPOXIDES

Moscow PLASTICHESKIYE MASSY in Russian No 10, 1979, submitted 13 Jul 78
signed to press 25 Sep 79 pp 9-10

BATOG, A. YE., PET'KO, I. P., KOZLOVA, L. V., and PANDAZI, I. F.

[Abstract] New alicyclic triepoxides and tetraepoxies based on complete acylation of polyols by unsaturated hydroaromatic acids or their anhydrides were synthesized to verify the assumption that compactly structured alicyclic epoxies containing several esterized groups may form, upon hardening, heat resistant polymers with satisfactory strength and elasticity. This was verified and it was suggested that these epoxies may be used to produce heat resistant, high-strength sealing compounds and impregnation compounds and bonding agents for reinforced plastics. References: 4; Figures: 3.
[72-2791]

USSR

UDC 678.742.2 56.097:539.2

EFFECT OF COMPOSITION AND STRUCTURE OF COMPLEX HETEROGENIC CATALYSTS ON
MOLECULAR STRUCTURE AND PROPERTIES OF POLYETHYLENE

Moscow PLASTICHESKIYE MASSY in Russian No 10, 1979 submitted 28 Mar 78
signed to press 25 Sep 79 pp 11-13

SEMENOVA, S. A., GRIGOR'YEV, V. A., LEYTMAN, M. I., ANDREYEVA, I. N.,
NALIVAYKO, YE. I., POLYAKOV, A. V., KOROBOVA, N. M. and STEFANOVICH, L. G.

[Abstract] A study was made of the possibility of directional regulation of the structure and properties of high density polyethylene produced with the use of catalysts with different structures and properties. Connections between the type of heterogenic catalyst used, the structure of polymers produced by the use of the different catalysts and the physico-mechanical properties of these polymers were discussed and compared.

References: 20; Figures: 3.

[72-2791]

USSR

UDC 678.027.073.046.076

NEW TECHNOLOGY FOR PRODUCING PRODUCTS FROM THERMOPLASTICS REINFORCED WITH
A CONTINUOUS FIBER

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 5, 1979 pp 18-21 manuscript
received 17 Apr 79

SHOROKHOV, V. M. and SHEVLYAKOV, A. S., Ukrainian SSR Academy of Sciences
Institute of High Molecular Compounds

[Abstract] A description is given of a technology which makes it possible to produce large thin-sheet complex-relief products out of polymeric composite materials with a thermoplastic matrix reinforced with continuous fibers with an orthotropic or anisotropic arrangement and a maximum fiber content of 80 percent by weight. Essentially, the method consists in hot forming in an intermediate product rig an intermediate product produced by weaving methods, according to the technology for knitted and inserted materials or by winding on, from continuous reinforcing and continuous matrix fibers made of thermoplastic polymers. In the forming process, the polymeric fibers, evenly arranged between the reinforcing fibers, are converted by heating into a melt which impregnates the reinforcing fibers under the forming pressure in the enclosed space of the rig. The melt hardens by cooling without removing the pressure, and the intermediate product is changed into a polymeric composite material product with a thermoplastic matrix, whose form is governed totally by the rig. Trapped

air is excluded by evacuating the space containing the intermediate product during the heating process and then pressing the product with the moving forming portion of the rig. The resulting void content is not greater than three percent by weight. This technology represents maximum simplicity, and is performed on equipment for hot vacuum forming of products made of polymeric composite materials with a thermosetting matrix, without any further improvement of this equipment. The new technology is called the "nonimpregnation" method, since the intermediate product and the final product are produced without the use of resinous and liquid components or solvents and the operation of impregnating the continuous reinforcing fibers with the polymer melt is performed in the closed rig and is combined with forming the product. On an experimental rig developed by the authors were fabricated by the hot vacuum forming method sheets of continuous glass fiber reinforced polyformaldehyde, Lavsan (polyethylene terephthalate), polyporpylene and polyamide (Kapron) with a different ratio of reinforcing and matrix fibers in the form of multifilament threads. The characteristics of different intermediate products for the nonimpregnation technology are given in a table. In another table are given the physico-mechanical properties of the polymeric composite materials produced, along with technological parameters of the forming process. Having the greatest influence on the properties of glass reinforced thermoplastics are the type of polymer and reinforcing fiber, the degree of filling and the texture of the intermediate product. The best physicomechanical properties are exhibited by materials made from intermediate products with a separate arrangement of high-modulus glass and Lavsan polymeric reinforcing threads. The new technology, as opposed to the old method of using poured thermoplastics, results in higher strength characteristics for reinforced thermoplastics. The employment of a vacuum in hot forming results in high density and low water absorption. References 8 Russian. [41-11,176]

USSR

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ELECTROPHORETIC POLYMERIC COATINGS BASED ON SILICONES

Kiev KHIMICHESKAYA TAKHNOLOGIYA in Russian No 5, 1979 pp 25-26 manuscript received 20 Jun 77

TERTYKH, L. I., DEYNEGA, YU. F., VARLAMOVA, N. V., SEVERNYY, V. V. and ZAMANSKIY, A. A., Ukrainian SSR Academy of Sciences IKKHIKHV [expansion unknown] and USSR Ministry of the Chemical Industry

[Abstract] By electrophoresis coatings have been produced which are based on silicone resins containing ethoxyl and hydroxyl radicals as functional groups. The addition of OC_2H_5 and OH groups ensures chemisorptive interaction with the surface of the electrode and thus improves the coating's adhesion. The results are given of an investigation of processes of the

formation of stable and charged dispersions of resins 133-34 and 133-53, having an R:Si ratio of not greater than 1.8, and of conditions for their precipitation in an electric field. Concentrated emulsions (15 percent) of resin 133-34 were produced with a UZDN-1 unit at a frequency of 22 kHz. Cetyltrimethylammonium bromide, a cation-active surface-active substance, was used as the stabilizer and charger in a quantity of 0.13 percent by weight in relation to the dispersed phase. With an optimal sonic irradiation strength and an anode current of 70 mA, a study was made of the influence of the dispersion time on the stability of emulsions formed. The results are given for a determination of the influence of the duration of sonic irradiation on the formation of a 15 percent emulsion of resin 133-34 in water; the optimal sonic irradiation time is 45 s. Stable emulsions do not form in a shorter period. Data are given illustrating the influence of the concentration of the dispersed phase on the electrical properties of an emulsion of 133-34 in water. A change in the concentration of the dispersed phase does not exert a noticeable influence on the electrokinetic potential of an emulsion of resin 133-34. The optimal conditions for producing continuous uniform coatings are a concentration of a two to four percent emulsion, a current density of 0.1 to 1.0 mA/cm² and a settling period of from one to nine minutes. The coatings produced have a thickness of 1 to 20 depending on the settling time. With current densities greater than 1 mA/cm² the dispersed phase coagulates in the cell. Concentrated emulsions of greater than 80 percent result in the formation of thick films which fell apart when removed from the cell. The coatings were heat treated at 200 to 250°C. Stable dispersions of silicone resin 133-53 were produced by salting out the resin from acetone in an aqueous solution of cetyltrimethylammonium bromide. The high viscosity of the resin made ultrasonic dispersion ineffective. Stable dispersions were produced with a resin content of 1.3 to 2.2 percent and an electrokinetic potential of 50 to 55 mV. A table is given of the key characteristics of the properties of coatings based on silicone resins 133-34 and 133-53. Adhesion is shown to be much better in these resins than in resins based on polyethylhydrosiloxane. Resins 133-34 and 133-53 have good adhesion and good water repellent and electrical insulation properties. Figures 2; references 7 Russian. [41-11,176]

USSR

UDC 632.9:635

ACHIEVEMENTS AND PROBLEMS OF THE CHEMICAL METHOD OF CONTROLLING DISEASES OF AGRICULTURAL CROPS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 9, 1979 pp 13-16

KOBAKHIDZE, D. M., All-Union Institute for the Protection of Plants

[Abstract] Selection and efficient application of fungicides against a combination of diseases were considered only with regard to periodic outbreaks of the diseases during the 1930s-1940s. Up to 1961 only copper- and sulphur-containing fungicides such as bordeaux liquid, copper sulfate and ground and colloidal sulphur were used, while organic mercury preparations of granosan and mercuran were used as seed disinfectants. The economic significance and potential harm of the disease, the dynamics of development during the vegetation period, the specifics of the host and parasite relationships, symptoms of a diseased plant and the characteristics of action of toxic substances on the pathogenic agent of the disease are taken into account when developing a scientifically based variety of fungicides and seed inoculants. Potentially harmful Bordeaux liquid has been replaced by effective substitutes such as zineb, polycarbacin, polymarcin, captan, phthalan and carpen while combination copper-containing organic fungicides include cuprosan, cuprocin-1 and polychom. Organic fungicides such as karatan, morestan, morocide, akreks and also wettable colloidal sulphur powder have been recommended to control powdery mildew of various agricultural crops. Fungicides of systemic action occurred toward the end of the 1960s. The practice of chemical immunization of plants was also effective against loose smut of grain crops, pyriculariosis of rice and late blight of potatoes. The domestic preparation EF-2 can be used in combination with TMTD or HCB as a replacement for mercury-containing seed disinfectants and for complex protection of grain crops against covered smut and crown rot. Systemic preparations of seed disinfectants such as vativax protects grain crops against covered smut and increases the yield by 3-4 qt/ha. The use of systemic preparations in combination is effective in protecting grain crops against covered smut, powdery mildew and rust. Suspensions of the systemic fungicides benomil, uzgen and fundasol by flooding the soil under the plants proved effective in controlling various diseases of vegetable crops. Fundasol and nitragine are also promising for joint treatment of soybean seeds. The number of treatments of fruit crops can be reduced if systemic fungicides are used in combination with surfactants or if the wintering-over stages of the pathogenic agents of the diseases are destroyed by treating the trees after harvest. Some pathogenic fungi develop resistance to systemic fungicides with extensive use of them. References 12 Russian. [53-6521]

THE EFFECTIVENESS OF PYRIMOR, AKTELLIK AND PP-199 AGAINST APHID VECTORS OF POTATO VIRUSES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 9, 1979 p 20

LODOCHKIN, L. I., All-Union Institute for Protection of Plants

[Abstract] Pyrimor, PP-199 and Aktellik were tested under field conditions in 1977-1978 at the Tolstopal'tsevo Experimental Demonstration Farm of Moskovskaya Oblast to determine the effectiveness against aphid vectors of potato viruses. The plants were sprayed when wingless aphids appeared on the leaves. The rate of application was 400 liters per hectare of working liquid, the area of the experimental plot was 25 m² and the repetition was fourfold. The aphids were counted on 100 leaves of 100 plants every 10, 20 and 30 days after treatment. The initial infestation of the potatoes and later infestation were determined by the serological method. The yield was counted for 100 plants in each variant. Pyrimor at rates of 1.2 and 2.0 kg/ha reduced the number of aphids on the potato leaves to single specimens, as a result of which the infestation of the plants by virus M was reduced by a factor of three compared to the control. The infestation of the leaves by viruses X and S did not change appreciably. Application of pyrimor at a rate of 2.0 kg/ha reduced the potato yield, while the yield remained the same as the control at a rate of 1.2 kg/ha. Aktellik reduced the infestation of plants by virus M by 24 percent in a concentration of 0.05 percent and by 40 percent with a concentration of 0.075 percent. Preparation PP-199 in a concentration of 0.005 percent did not reduce the infestation of plants by viruses and the number of aphids. A concentration of PP-199 of 0.05 percent reduced the infestation by 16 percent and the number of aphids on the leaves was reduced, while the yield of tubers was increased. Pyrimor is most effective at rates of 1.2-1.5 kg/ha against aphid vectors of potato viruses. [53-6521]

TMTD AS A SEED DISINFECTANT

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, 1979 pp 22-23

ANDREYEVA, YE. I., All-Union Scientific Research Institute of Chemicals Used for Plant Protection

[Abstract] Tetramethylthiuramdisulfide in an 80 percent wettable powder is a finely dispersed yellowish or gray substance with irritating effect and marked accumulation used at a rate of 400 mg/kg against rats and

210 mg/kg against rabbits. The maximum permissible concentration of the preparation in the air of production spaces is 0.5 mg/m^3 . TMTD is used to treat seeds against various types of fungal-bearing pathogenic agents which cause mold, smut and blight and beronosporosis in various types of crops. The preparation also stimulates the development of plants and increases yield. The preparation is used to protect the seeds and sprouts of corn, legumes, commercial, medicinal, flower and other crops against the pathogenic agents of disease. Conditioned seeds are treated prior to sowing on the farms or in specialized shops at plants at the rate of 1 kg of TMTD and 5 liters of water per ton of seed. The rate of application is 30 kg/ton when treating cotton seeds against the pathogenic agents of mold and root rot. Since TMTD is not active against many bacterial types of pathogenic agents such as bacterial blight of cotton, the cotton seeds should be additionally treated with 20 percent copper trichlorophenolate powder after treatment with TMTD. Protective-stimulation compositions which include TMTD at the rate of 5 kg/ton are used to treat sugar beets. The preparation is used at different rates of application to treat seeds on farms from 1.5 to 2 kg/ton for corn, sorghum, flax, peas, wheat and rye to 6 to 8 kg/ton to treat cabbage, tomato, table beet and carrot seeds. A preparation of 80 percent wettable TMTD powder is also used to treat potatoes at the rate of a 3 percent suspension calculated at 60-70 liters per ton and to treat carrot seeds at the rate of 6-8 kg/ton prior to winter storage and planting in the soil on seed plots. TMTD provides the best protection when treated seeds are planted in cold soils and during a cold spring and the protective properties of the preparation are retained for more than 30 days in the soil. TMTD can also be mixed and used with different chlorinated and other pesticides, growth-stimulating substances and trace elements. It is not recommended that the preparation be used to control diseases of vegetating plants due to its high stability and low rate of decomposition on the plants. Personal and public safety rules must be strictly observed when working with the substance by using various types of respirators, special types of safety glasses and dust-impermeable cotton overalls, cotton gloves with special coating and rubber boots. Treated seed must not be used for food or commercial purposes or for feeding cattle. Treated grain must be stored in specially adapted warehouses and can be used for planting the following year if good sprouting of the seeds is first determined. [53-6521]

USSR

UDC 632.954

THE MAIN STAGES OF HERBICIDE STUDY

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, 1979 pp 24-27

VOYEVODIN, A. V., All-Union Institute for the Protection of Plants

[Abstract] Various types of carbamate preparations, organic compounds, aliphatic compounds, derivatives of triazine and urea and other compounds

numbering more than 400 individual substances which manifest herbicidal properties and several thousand preparative forms including mixtures of herbicides have been developed since the 1940s. The techniques of producing the main types of herbicides, methods of application and also medical and sanitation-hygienic support of work with herbicides have been worked out. The procedures for development of herbicides follow the main trends of forming the assortment of preparations, biological justification of their use and solution of technical problems at the Laboratory of Herbicides of the All-Union Institute for Protection of Plants. The herbicides, both domestic and foreign, undergo state trials at toxicological laboratories of VIZR in various sections of the USSR and also at branch institutes. More than 100 herbicides were recommended for use during 1960-1978 as a result of these trials. In addition to general testing of herbicides for specific types of crops, they are also studied to expand the assortment, to increase the number of herbicides used on vegetating crops and to prevent the undesirable effect of herbicides on entomophages and useful entomofauna and to reduce the storage time of the herbicides in the soil and environment. The main thrust of biological approval is to study the effect of herbicides on the microflora and nutrient conditions of the soil, on the quality of the yield and their capability of being retained in the product, soil and water in residual amounts. The quality of grain such as carbohydrate, protein and vitamin content as a result of using herbicides is within the range of indicators obtained with the use of fertilizers and irrigation and with weather effects and residual amounts of herbicides in the soil are safe for subsequent crops and for the inhabitants of reservoirs. The results of treating 20 varieties of spring wheat and also barley and oats with optimum doses of 2,4-D at the rate of 0.8 kg of amine salt per hectare showed a correlation between the plant resistance to the herbicide and the growth intensity of the above-ground organs and roots, the ratio of their mass and also the degree of bushiness of the plant and the length of the ear. Treatment of spring wheat over several generations with 2,4-D showed deterioration of the grain structure during subsequent reproductions if they were treated during the second and third stages or organogenesis, while the plants were more resistant to the herbicide when treated during the fourth-sixth stages of organogenesis. Treatment of cotton fields with kotoran, diuron and prometrin showed a disruption of vitality of the plants during subsequent treatments after the first treatment, which indicates adaptation of the cotton to the herbicides. A three-year study of four potato varieties with arezin, prometrin, patorin and meturine at rates of 2.5 kg/ha and of zenkor at rates of 0.75 kg/ha showed that the quality of the tubers was not affected either during harvest or after prolonged storage. Herbicides applied to root crops such as radishes, carrots and beets inhibit somewhat the development of sprouts during growth and differentiation of the axial organs in length, intensive development of roots and development of the xylem, but accelerate and stimulate the development of these crops during later periods of sprout development. Herbicides had a slightly inhibiting effect on the

development of various types of food, sugar and table beets during their early growth, while they stimulated the later growth. The phosphorus content of spring wheat and barley was reduced upon application of 0.8-1.2 kg/ha of the sodium salt of 2,4-D, while the phosphorus content of the lipid fraction was reduced, while the phosphorus content of the mineral and residual fractions were increased in barley, peas and wheat upon application of 2,4-D and simazine. The protein, DNA and RNA content of spring wheat was reduced while DNA-RNA complex was slightly disrupted upon application of the sodium salt of 2,4-D. The neoformation of nucleic acids was stimulated in peas during the first stages of development after application of simazine, but the process was suppressed as the herbicide was accumulated in the leaves and the ribonuclease activity was simultaneously reduced somewhat. Technological procedures of using herbicides are studied to a lesser extent since VIZR does not have the capabilities to work out these procedures. The chemical method of controlling weeds in plantings of grain crops such as corn, commercial crops, vegetables, vineyards and fruit orchards and fodder crops is being developed by the Laboratory of Herbicides of VIZR. References 36: 35 Russian; 1 Western.
[53-6521]

USSR

UDC 631.547:635.656

THE USE OF CHLOROCHOLINECHLORIDE TO INCREASE THE DROUGHT RESISTANCE AND PRODUCTIVITY OF PEAS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, 1979 pp 27-29

DOLGOPOLOVA, L. N. and LAKHANOV, A. P., All-Union Scientific Research Institute of Legume-Grain and Groats Crops

[Abstract] The effect of chlorocholinechloride on increasing the productivity and drought resistance of peas was studied with respect to the cultivation technique. Field and vegetation experiments were conducted during 1972-1977 in Orlovskiy Rayon of Orlovskaya Oblast with peas of varieties Uladovskiy 303, Ul'yanovskiy 68, Gor'kovskiy 186 and Kormovoy 24. The soil was dark gray loessy and the soil moisture content was maintained at 70 percent of total moisture capacity during the vegetation experiments. Irrigation was stopped during the budding-blooming phase, which created a drought situation lasting for seven days. The moisture content of the soil decreased to 20-25 percent of total capacity during this period. Irrigation was then restored and the optimum moisture content of the soil was maintained until the end of the vegetation period. The area of the plantings during field experiments comprised 20 to 100 m² and the frequency was 4-5. The domestic preparation tur was used as a retardant by spraying the plants in concentrations of 0.00002-0.5 percent

at the rate of 800 liters/ha and 1-24 percent at the rate from 3-0 to 25 liters/ha, by wetting the seeds in tur solutions in concentrations of 0.0002-2 percent for 10 hours, by semi-dry treatment of the seeds with a suspension of the preparation in concentrations from 1 to 50 percent and by application of tur to the soil at rates of 2-12 kg/ha. The control plants were sprayed with water. Application of the preparation at a rate of 6 kg/ha to the soil prior to pruning the crop was the best method of treating peas with tur, resulting in a seed and straw yield 30 percent above the control. The most effective method of spraying was treatment with a 0.5 percent tur solution at a normal rate of 4 kg/ha and the use of a 1 percent solution when the seeds were wetted, which resulted in an increase of productivity of peas during the drought period by 11-12 percent as compared to the control. The most optimum period of spraying peas with the tur is the beginning of the budding stage. An increase of the yield was observed in field experiments even when the plants were treated during later development phases such as blooming and grain formation. When the seeds were treated with a 30 percent tur suspension prior to planting, the grain and straw yield increased by 50.9 and 78.0 qt/ha, respectively, compared to 45.5 and 70.0 qt/ha for the control, while the crude protein content in the grain remained unchanged. The use of tur in all the tested doses and various methods of treatment was safe in the toxocological sense. References 12: 8 Russian, 4 Western.
[53-6521]

USSR

UDC 581.192.7:633.511

THE EFFECT OF CROTONOLACTONE ON COTTON PRODUCTIVITY

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, 1979 pp 18-20

RAKHMANOV, R. R., DZHURAYEV, O., ABRAMYANTS, S. V., LATASHKO, V. M., BADOVSKAYA, L. A. and KUL'NEVICH, V. G., Krasnodar Polytechnical Institute

[Abstract] Crotonolactone preparation produced by processing the plant wastes of furan compounds was tested as a biological stimulator during 1973-1974. The optimum results under laboratory conditions are achieved when cotton seeds are treated with a 0.05 percent aqueous solution of crotonolactone. The sprouting energy of treated seeds was increased by 9-10 percent and the length of the shoots was increased by 18.7 mm. Field experiments were conducted on the Kolkhoz imeni N. Niyazov of Yangi-Yul'skiy Rayong of Tashkentskaya Oblast on typical serozem soil with deep ground water deposits and on the Sovkhoz imeni Pyatiletiya Uzbekistan of Nizhnechirchikskiy Rayon of Tashkentskaya Oblast on meadow soil with shallow deposition of ground waters. The frequency of the experiments was four and the varieties of cotton were Tashkent-1 and

Tashkent-3. Sprouts appeared earlier in the cotton when the seeds were wetted in a 0.05 percent solution of crotonolactone prior to planting compared to wetting the seeds in water and true leaves also appeared earlier. Twenty-six percent of the plants treated with crotonolactone had bloomed at the beginning of the blooming stage, while only 17 percent in the control had bloomed. Those cotton plants treated with the biological stimulator had 72 percent of bolls that opened up compared to 56 percent in the control. The yield of cotton was increased by 2-3 qt/ha on plots treated with crotonolactone at the Kolkhoz imeni N. Niyazov, while the increase of yield was 1.5-2 qt/ha at the Sovkhoz imeni Pyatiletiya Uzbekistan. The cotton plants were also sprayed with 0.05 percent solution of the preparation during the budding and blooming stage. This produced an additional increase of yield and also an increase of the oil content of the cotton seeds. Crotonolactone produced from furfural and the waste cube resins from its production also had a stimulating effect on the growth, development and productivity of agricultural crops. Field experiments were conducted on the Kolkhoz Leninskiy Put' of Verkhnechirchikskiy Rayon of Tashkentskaya Oblast during 1976-1977 to study the effect of raw crotonolactone on the yield of cotton. The experiments were conducted on a plot of two hectares with cotton of Tashkent-1 variety and repetition of four. The seeds were wetted prior to planting in a 0.05 percent solution of raw crotonolactone and the plants were sprayed with a 0.05 percent solution during the budding stage. The yield of raw cotton was increased by 1-2 qt/ha when the seeds were wetted with crotonolactone prior to planting, while the yield of raw cotton was increased by 1.8-2.5 qt/ha and the oil content was increased by 0.68 percent with a combination of pre-planting treatment and top dressing of the cotton during budding with raw crotonolactone. The preparation also had a positive effect on the strength and length of the cotton fiber. References 8 Russian. [53-6521]

USSR

UDC 632.954:633.11

THE USE OF DICURAN AND SIMAZINE ON WINTER WHEAT PLANTINGS IN RYAZANSKAYA OBLAST

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, 1979 pp 31-32

PESHKOVA, G. P., Ryazan Medical Institute and ULINA, A. I., Ryazan Agricultural Experiment Station

[Abstract] Dicuran and simazine were used on winter wheat plantings of variety Mironovskaya-808 at the Ryazan Agricultural Experiment Station during 1975-1977. The rates of application were 2-3 kg/ha of dicuran and 0.25-1 kg/ha of simazine. The soil of the experimental plot was dark gray loessy heavy loam with humus content of 3.4 to 3.8 percent

in the 0-20 cm layer, available phosphorus content of 8.9-10.3 mg, exchangeable potassium content of 11.0-11.5 mg, total absorbed bases of 22-24 mg-equiv per 100 grams, pH of 5.4-5.5 and hydrolytic acidity of 3.7-4.1 mg-equiv per 100 grams of soil. The meteorological conditions during the three years of testing were mainly favorable for winter wheat crops, ranging from 382 mm in 1975 to 468 mm in 1976. Spring periods were characterized by warm weather with sufficient precipitation. The increase in grain yield due to use of the herbicides averaged 4.2 q/ha during the three years of use of dicuran and 3.0 with use of simazine. Rates of application of 2.5 kg/ha of dicuran increased the grain yield by an average of 5.4 qt/ha over the three years, while the best rate of application of simazine of 0.75 kg/ha increased the average yield by 4.3 qt/ha over three years. Use of the herbicides had no appreciable effect on grain quality except an increase of protein content was observed with application of dicuran at the rate of 3 kg/ha. The herbicides had a 70 percent toxic effect on young weeds, but their effect on perennials was insignificant. No residual amounts of the herbicides in the wheat grain were detected by the thin-layer chromatographic method.

References 5 Russian.

[53-6521]

USSR

UDC 547.461

BISCHLORPHOSPHAZOCARBACYLS

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 5, 1979 pp 15-17

RUDAVSKIY, V. P.

[Abstract] For the purpose of continuing a study of the biological activity of phosphorylated derivatives of dicarbonic acids, bischlorphosphazocarbacyls were produced by the phosphazo reaction method. Diamides of dicarbonic acids with phosphorus pentachloride produce bistrichlorphosphazocarbacyls. A convenient method of preparing bistrichlorphosphazocarbacyls is to react diamides of dicarbonic acids with phosphorus trichloride and chlorine or pure phosphorus and chlorine. For this purpose dry chlorine is admitted into a mixture of a diamide of dicarbonic acid, phosphorus trichloride or pure phosphorus and a solvent. Alkyl(aryl)tetrachlorophosphorus and diaryltrichlorophosphorus react with diamides of dicarbonic acids in a similar manner to phosphorus pentachloride, but at higher temperatures. Reacting diamides of dicarbonic acids with aryldichlorophosphide and chlorine is cited as a method of preparing bisaryldichlorphosphazocarbacyls. Bisalkyl(aryl)-dichlorphosphazocarbacyls are formed by interacting alkyl(aryl)tetrachlorophosphorus with diamides of dicarbonic acids. Bisdiarylchlorphosphazocarbacyls can be produced by two methods: by interacting diaryltrichlorophosphorus with diamides of dicarbonic acids, and by admitting

chlorine to a mixture of a diamide of dicarbonic acid and diarylchlorphosphine. Diamides of dicarbonic acids can be reacted with phosphorus pentachloride and its derivatives without a solvent at atmospheric pressure in a 300 to 400 mm Hg vacuum or in solvents such as carbon tetrachloride, benzene, chlorobenzene and nitrobenzene. The use of a solvent results in higher yields and a purer product. Bistrichlor-bisalkyl(aryl)dichlor-, and bisdiarylchlorphosphazocarbacyls are relatively low-melting crystalline substances or thick fluids which crystallize in two to four hours. Some bischlorphosphazocarbacyls do not crystallize even after 24 h and remain as thick fluids. All bischlorphosphazocarbacyls dissolve easily in benzene, xylene, dioxane and acetone, and with difficulty in ether and petroleum ether. When boiled with an excess of water or a hydrous alcohol, bistrichlor-, bisalkyl(aryl)dichlor- and bisdiarylchlorphosphazocarbacyls disintegrate into diamides of dicarbonic acids, phosphoric, alkyl(aryl)phosphonic and diarylphosphinic acid and hydrogen chloride. In the presence of traces of hydrogen chloride, bischlorphosphazocarbacyls disintegrate even at room temperature. It is thus necessary quickly to remove hydrogen chloride from the reaction medium in the synthesis of bischlorphosphazocarbacyls. Given in detail are the methods of producing bistrichlorphosphazocarbacyls, bisalkyl(aryl)dichlorphosphazocarbacyls, and bisdiarylchlorphosphazocarbacyls. Also described are the hydrolysis of bistrichlor-, bisalkyl(aryl)dichlor- and bisdiarylchlorphosphazocarbacyls to diamides of carbonic acids, the thermal disintegration of bistrichlor-, bisalkyl(aryl)dichlor- and bisdiarylchlorphosphazocarbacyls, and the effect of hydrogen chloride on bistrichlor-, bisalkyl(aryl)dichlor- and bisdiarylchlorphosphazocarbacyls. References 3 Russian.

[41-11,178]

ACHIEVEMENTS OF INSTITUTE OF PETROCHEMICAL PROCESSES DISCUSSED

Baku BAKINSKIY RABOCHIY in Russian 25 Oct 79 p 2

[Article by V. Aliyev, academician of the Azerbaijan SSR Academy of Sciences, director of the Institute of Petrochemical Processes, the republic's honored man of science and technology: "The Flagship of Petroleum Refining and Petrochemistry"]

[Text] One of the country's most outstanding research institutes--the Order of the Red Banner of Labor Institute of Petrochemical Processes imeni academician Yu. G. Mamedaliyev of the Azerbaijan SSP Academy of Sciences--is 50 years old. The Aznefti Central Chemical Laboratory subsequently reorganized into the Azerbaijan Scientific Research Institute for Petroleum Refining imeni V. V. Kuybyshev was the predecessor of the Institute of Petrochemical Processes.

From the first years the institute paid much attention to the study of the composition and systematization of Azerbaijan's high-grade unique petroleum. This made it possible to recommend the most efficient directions in its processing. The investigations conducted in the 1930's led to the introduction of tubular petroleum refining units, including pyrolytic ones, highly productive for that time into the industry. Original processes for the production of low-cold-test aviation and automotive oil and of such important petrochemical products as aromatic hydrocarbons and ethyl alcohol were developed.

The Great Patriotic War was an important landmark in the institute's history. As is well known, at that time Azerbaijan was the main supplier of fuel and oil in the country. Naturally, all scientific research was subordinated to the task of providing the front and rear with high-grade fuels and lubricants. The institute's scientists have a right to be proud of the fact that they made a worthy contribution to the cause of victory of the Soviet people over fascism. They developed and introduced processes for the production of high-octane aviation gasoline, high-octane gasoline additives, nitrotoluene and so forth.

During the postwar period, when the country restored the national economy and new types of engines appeared, an attempt to provide them with new types of fuel and oil was clearly defined in the institute. Scientists embarked on the development of theoretical principles of thermocatalytic refining of crude petroleum. As a result, an original technique of the "fluidized" bed of the catalyst was proposed. This was the first process in the USSR making it possible to greatly increase the raw material resources of high-octane gasoline for aviation and motor transport on the basis of middle and heavy petroleum cuts, which did not find skilled application.

The same process also gave valuable raw materials--reactive gases--to petrochemistry. Later seven units were built in the Soviet Union and two, in Poland and Rumania. All the facilities have been in operation up to now. These investigations became a solid foundation for the introduction of the technique and technology of the fluidized bed in the petroleum refining and petrochemical industry and in nonferrous metallurgy.

Owing to the long-term study of the problem, it was possible to develop and introduce the first domestic additives, which greatly improved the operating qualities of lubricating oil.

One of the most important trends in the institute's activity in the 1960's led to the development of a method of refining paraffin petroleum. It made it possible to organize the production of low-cold-test jet and diesel fuel, low-viscosity oil and paraffin of a high degree of purity. The process gained recognition. It is used at enterprises in Novokuybyshevsk, Ufa, Moscow and Baku. Plans are made to carry it out at another four plants.

In the last 2 decades, in order to improve the quality of motor and diesel oil from Baku petroleum, whose composition and properties changed sharply, the Institute of Petrochemical Processes proposed combined processes including deasphalting, deparaffination and selective cleaning. The methods were introduced in Azerbaijan.

Of great scientific and practical interest are the processes of obtaining from the petroleum gas butane and isopentane divinyl and isoprene respectively--the source material for large-capacity facilities for the production of synthetic rubber. The biggest plants of Azerbaijan and the Russian Federation mastered them. Petrochemistry was able to give up the use of a vast amount of food products as raw materials and now they are used according to their direct purpose. At the same time, the production of rubber greatly increased in the country and production costs were lowered.

In cooperation with the All-Union Aluminum and Magnesium Institute and Azgiproneftekhim the process of roasting and reducing alunite ore in the "fluidized" bed was developed for the first time in world practice. This

made it possible to establish in Kirovabad a large-capacity production of alumina (aluminum raw material), sulfuric acid and potassium fertilizers from alunite located near the Zaglikskoye deposit. The process was patented in a number of countries and a license was sold.

The staff of the institute together with the republic's State Planning Committee and planning organizations formulated a long-term plan for the further development of the Sumgait industrial region. It envisages the expansion and reconstruction of petrochemical and chemical production facilities, improvement in technological systems, a more efficient utilization of raw materials, reagents, fuel and electric power, output of new types of products, improvement in economic indicators and so forth.

The in-depth investigations conducted at the Institute of Petrochemical Processes in a number of promising directions led to the fact that five independent institutions were organized at the base of some of its laboratories and divisions, that is, institutes of chemistry of additives, of theoretical problems of chemical technology and of organochlorine synthesis, a sector for radiation research of the Azerbaijan SSR Academy of Sciences and the all-Union sectorial institute VNIPIgaz (All-Union Scientific Research and Planning Institute of Gas). The Institute of Petrochemical Processes is rightly proud of their achievements.

Of the directions and results of their work the scientists at the Institute of Petrochemical Processes consider, for example, contacting-catalytic processes, where advanced, new systems and reagents of an original design with ascending, through and semithrough flows of catalysts are used, important. Such is the catalytic cracking in through and semithrough flow, which increases productivity as compared with the "fluidized" bed by a factor of 8 to 10 and makes it possible to develop machines of a large unit capacity and to reprocess heavy types of raw materials. The process was introduced at enterprises in Baku, Ryazan', Ufa and other cities.

A new variant of the method ensuring the production of the high-grade AI-93 gasoline directly in the process of catalytic cracking of sulfur and nonsulfur raw materials without the use of a toxic lead tetraethyl solution was recommended for expanding application at the country's petroleum plants in the last few years. This is of great importance not only for improving the economic indicators of production, but also for protecting the environment from pollution by the harmful exhaust gases of engines.

The method of obtaining ethylene oxide needed for the petroleum and petrochemical, light and aviation industries, in medicine and in everyday life is among the original methods. The new reactor system developed especially for this technology makes it possible to perform a number of difficultly controlled processes and to build automated small-size machines of a large unit capacity with a considerable reduction in their metal and power intensiveness. The process was accepted for introduction and was patented abroad.

It should be especially noted that the Institute of Petrochemical Processes together with the Kasporneftegazprom Association and the Institute of Physics of our academy developed the A-4 reagent, whose practical utilization solves such important problems of nature protection as a complete cleaning of drilling and other waste water of industry from petroleum and petroleum products, organization of a system of circulating water supply at enterprises and so forth. The Azerbaijan SSR Council of Ministers adopted a decree on the expanding application of A-4 in the national economy. Thousands of enterprises in the country became interested in this reagent. To meet their need, large-capacity units are now put into operation in the republic.

Of course, in a newspaper article it is impossible not only to discuss all the petrochemical processes developed at the Institute of Petrochemical Processes, but also to enumerate their names. The institute services many industrial sectors, including the perfumery sector, and also works for agriculture. Therefore, let us confine ourselves to several characteristic figures.

A total of 69 processes with an overall economic effect of 74 million rubles were introduced into the industry of the Soviet Union during the post-war period. Realization of a number of other processes with an expected effect of 23 million is envisaged before the end of the 10th Five-Year Plan. All this work is based on fundamental in-depth theoretical investigations by scientists at the Institute of Petrochemical Processes in promising directions of scientific development. A considerable part of the work is done at the level of inventions. In the last 15 years our workers obtained more than 400 authors' certificates and 80 foreign patents. A total of 10 monographs and more than 1,000 scientific articles were published. The experimental industrial plant of the institute with more than 70 technological units is a kind of connecting link between research laboratories and the national economy and contributes to an acceleration of the rates of introduction. Expansion of the list of valuable chemical products of the republic's industry ensures a growth of the national income to a certain degree.

The Institute of Petrochemical Processes helps the petroleum and chemical industry in the training of highly skilled personnel in many specialties not only for Azerbaijan but also for the entire Union, as well as for developing countries--India, Iraq, Burma and others.

For achievements in the development of petroleum refining and for the introduction of highly efficient, new processes into the industry the institute was awarded the Order of the Red Banner of Labor and in connection with the 100th anniversary of the republic's petroleum industry, the Certificate of Honor of the Presidium of the Azerbaijan SSR Supreme Soviet. Dozens of scientists were awarded state prizes of the USSR and the republic.

The achievements of the Institute of Petrochemical Processes were displayed at republic, all-Union and international exhibits, where its work was marked by diplomas and medals.

The staff of the Institute of Petrochemical Processes in all its activity feels the daily attention and help of the Central Committee of the Communist Party of Azerbaijan, the republic's Council of Ministers and the academies of sciences and sectorial chemical ministries of the Union and Azerbaijan.

In the next few years scientists at the institute will have to perform even more complicated fundamental theoretical investigations designed for practical use. We must improve existing production facilities and processes of petroleum refining and petrochemistry, create highly efficient, new catalytic systems, which will make it possible to sharply improve economic indicators, lower power expenditures per unit of output, increase the output of white petroleum products from heavy raw materials and develop measures for the protection of the biosphere. We must still do a great deal in order to solve the main tasks set for scientists by the party and government, that is, to improve the efficiency and quality of investigations and to increase the yield of science for the national economy of our homeland.

We constantly remember and are guided by the order formulated by Leonid Il'ich Brezhnev during the days of celebration of the 250th anniversary of the USSR Academy of Sciences: "... The party expects from scientists an ever deeper and bolder investigation of new processes and phenomena, an active contribution to the cause of scientific and technical progress, a thoughtful analysis of the problems that arise and responsible recommendations for the best methods of solving them in the interest of strengthening the country's power, improving the life of the people and building communism."

[68-11,439]

11,439

CSO: 1841

USSR

UDC [621.892.096.1:62-63]025.4

UNIFICATION OF FUELS AND LUBRICANTS - AN IMPORTANT NATIONAL ECONOMIC PROBLEM

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 11, 1979 signed to press 21 Sep 79 pp 3-5

BRATKOV, A. A., NIKITIN, V. V., and RADCHENKO, YE. D.

[Abstract] In view of the present great need for economy in consumption of fuels and lubricants, the authors recommend revision of the existing large assortment of such materials. The absence of state and sectoral standards in classification, the complexity and lethargy in replacing obsolete and useless materials and the absence of a unified chemical motor oil agency for control of proper designations and use of appropriate sorts of fuels, oils, etc., have created the present deficiency in the classification system. This classification can be improved by compilation of a list of obsolete materials to be replaced, development and standardization of a limited list of fuels and lubricants to meet present needs, a plan for testing materials on the unified list and plans for production of the new sorts on scales required. References: 6.
[71-2791]

USSR

UDC 62-631.2:629.113

UNIFICATION OF AUTOMOBILE GASOLINES

Moscow KHIMIYA I TAKHNOLOGIYA TOPLIV I MASEL in Russian No 11, 1979 signed to press 21 Sep 79 pp 5-8

LEBEDEV, S. R., AZEV, V. S., KITSKIN, B. P., and MALYKHIN, V. D.

[Abstract] The need for unification of gasolines and the optimization of their performance levels to increase fuel efficiency and economy was discussed and reduction of their differences according to their anti-knock values was recommended. Procedures for realizing the unification of automobile gasolines were enumerated. References: 5; Figures: 3.
[71-2791]

USSR

UDC 62-634.2.025.4

UNIFICATION OF DIESEL FUELS FOR HIGH-SPEED DIESELS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 8-10

MITUSOVA, T. N., AZEV, V. S., ENGLIN, B. A., and KUKUSHKIN, A. A.

[Abstract] Problems involved in reducing the assortment of domestic diesel fuels and unifying their quality indicators were discussed. It was argued that only 3 brands of diesel fuel instead of the presently used 8 brands could practically meet all of the existing needs in respect to diesel engines. It was proposed that the new standard for diesel fuel purity replace the indicators of water content, mechanical impurities and the naphthenic acids and filter-ability coefficient with the one indicator, namely the filter-ability coefficient closely correlated with operational properties of the fuel. References: 2.
[71-2791]

USSR

UDC 621.892.097.2.025.4

UNIFICATION OF LUBRICANTS FOR AVIATION GAS TURBINE ENGINES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 11-13

NOVOSARTOV, G. T., SMEYANOV, V. A., VILENKIN, A. V., and YECHIN, A. I.

[Abstract] The increase of the assortment of lubricants for aviation gas turbine engines (now numbering more than 20) was described and methods for their unification were discussed. The assortment recommended included: MS-8p and MS-8RK oils for turbojet engines with operating temperatures up to 150°C; IPM-10 oil for turbojet engines with operating temperatures up to 200°C, and MN-7.5u oil for turboprop engines, thus reducing the assortment from 20 to 4 oils.
[71-2791]

USSR

UDC 621.892.097.2.025.4

UNIFICATION OF MOTOR OILS FOR SURFACE TECHNOLOGY

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 13-14

VIPPER, A. B., LASHKHI, V. L., and SHCHEGOLEV, N. V.

[Abstract] Problems involved in the unification of motor oils for use in automobile and tractor engines were discussed and characteristics required of prospective motor oil were described. The domestic, long-operating, All-Union oil DV-ASZp-10V was recommended as a general purpose oil for lubricating transmissions as well as engines. It can be used to replace more than 10 other brands of oil and provides savings of 40 rubles per ton of oil. The use of synthetic motor oils abroad was described briefly and some problems of production of domestic synthetic oils are listed. References: 4.

[71-2791]

USSR

UDC 621.892.025.4

USE OF DV-ASZp-10V (M-6z/10V) OIL IN ENGINES OF DIFFERENT INTENSITY

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 14-17

LASHKHI, V. L., VIPPER, A. B., DNEPROV, V. N., and SHCHEROLEV, N. V.

[Abstract] Results of comparison of indicators of DV-ASZp-10V, M-10GF1, M-8GFz oils and others and their performance in the KamAZ-740 (KAMA Automobile Plant) engine and detailed laboratory studies of them were used to propose a generalized criterion of the detergent properties of the oils with additives. This criterion is proportional to the inclination of the oils to oxidation and inversely proportional to the dispersion and detergent properties of the oils evaluated on a model device. The formula for calculation is presented. The criterion was used during selection of DV-ASZp-10V oil for KAM AZ-740 and it also simplified selection of motor oils for engines of different intensity. References: 6.

[71-2791]

USSR

UDC 665.637

PRODUCTION OF LOW-SULFUR BOILER FUELS FROM SULFUR AND HIGH-SULFUR PETROLEUMS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 27-29

RADCHENKO, YE. D., KAMINSKIY, E. F., KASATKIN, D. F., MITUSOVA, T. N.,
KORSHUNOVA, L. N., and GOLUBKOVA, G. D.

[Abstract] Three types of petroleum (Samotlorskaya, Romashkinskaya and Arlanskaya) were studied to determine the possibility of producing boiler fuels with sulfur content from 0.5 percent and higher by a procedure involving deep vacuum distillation of mazut with extraction of gas-oil up to 500 or 540°C--their hydrodesulphurization and removal of the hydrogenate above 350°C with crude tar oil. It was shown that with an increase of extraction of vacuum gas-oil, it is possible to reduce the sulfur content in the boiler fuel or to increase its yield. References: 2; Figure: 1. [71-2791]

USSR

UDC 665.642.4[477.8]

INTENSIFICATION OF OPERATION OF A SLOW-SPEEDING COKING DEVICE AT NADVORNYANSKIY PETROLEUM-PROCESSING PLANT

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, 1979
signed to press 21 Sep 79 pp 29-31

VALYAVIN, G. G., FRYAZINOV, V. V., YEZHOV, B. M., and VETOSHKIN, N. I.

[Abstract] Data of a comparative analysis of operation of two domestic devices of slow-speed coking with different lengths of runs between repairs were presented. Basic causes which limit the periods between repairs are the low aggregation stability of the raw material, the high share of distillate and the bulk gas content, the presence of crisis phenomena of heat exchange of the "second kind" the high duration of stay of the raw material in the reaction zone, the increase of hydraulic resistance in the transfer line and the linear speed of vapors in the reactors. Methods for increasing the periods between repairs and for improving the operation of the device as a whole were presented. References: 6; Figures: 2. [71-2791]

USSR

UDC 665.644.2.013.004.69.661.183.6

THE EXPERIENCE OF "YAROSLAVNEFTEORGSIINTEZ" PRODUCTION UNION IN THE
INTENSIFICATION AND MODERNIZATION OF THE 1A/1M CATALYTIC CRACKING
INSTALLATION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 3-5
manuscript received 1 Jun 78

RYBAKOV, P. N., MEL'MAN, A. Z., Yaroslavnefteorgsintez Union

[Abstract] The 1A/1M catalytic cracking installation of the author's union was put in operation in 1967. For some time the installation operated unevenly with frequent shutdowns, high catalyst utilization and low end product yield, only 75% of the rated productivity. The operation of the system began improving in 1969 and continued to improve through 1977, reaching and exceeding the planned level of production and time between maintenance operations. In 1973, raw materials for furfural extraction began to be produced on the 1A/1M installation. A diagram and explanation of the changes made to the installation to achieve these results are presented. It is now planned to convert the installation to a multistage-counterflow catalytic cracking installation by dividing the reactor with 3 plates, placing one of them in the present fluidized bed area of the regenerator, feeding in freshly regenerated catalyst at the top section of the reactor through a second transport line and replacing the existing cyclones with 5 groups of 2-stage cyclones. The redesign is expected to save over 1.5 million rubles per year. Figure 1.
[59-6508]

USSR

UDC 665.644.2.013.004.69.66-952.661.183.6

EXPERIENCE OF OPERATION OF THE 1A/1M INSTALLATION FOR TWO-STAGE CRACKING
WITH A ZEOLITE-CONTAINING CATALYST

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 5-7
manuscript received 5 Sep 78

[Abstract] The two-stage catalytic cracking installation of the UNPZ refinery is currently undergoing radical modernization in a series of stages. The basic phases of modernization include: installation of a second cracking stage; replacement of existing condensers with air cooled condensers; replacement of nichrome-wire corona electrodes with needle-type corona electrodes; replacement of the aluminum silicate catalyst with milled zeolite-containing type ASHNTS catalysts, then type KMTS catalysts; and installation of new type TSN-15 cyclones. The capacity of the installation is to be increased by 40-60%, the end-product yield per unit volume by 15-20%. This will require, in addition to the above

changes, installation of a new reaction vessel for the first stage of cracking, improvement of the design of the second cracking stage, modernization of the cyclones and modernization of the catalyst transport system, an increase in the condensor surface of the main fractional installation column and raw material heat exchangers, installation of a heat recovery system and a slime settling tank, as well as replacement of existing pumps with more powerful pumps. Figure 1.
[59-6508]

USSR

UDC 665.644.2.013.004.69.66-952

OPERATION OF THE TWO-STAGE 1A/1M CATALYTIC CRACKING UNIT AT THE NBNZ REFINERY IMENI VLADIMIR IL'ICH

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 8-10
manuscript received 12 Apr 78

RUSTAMOV, M. I., ALIYEV, V. S., PRYANIKOV, YE. I., ZEYNALOV, F. I., SHLYAKHOVSKIY, I. D., ABDULLAYEV, M. A., ALEKSANYAN, A. P., MKRITYCHEV, A. A.,
Institute of the Petrochemical Industry, AzSSR Academy of Sciences

[Abstract] Reconstruction of a 1A/1M type catalytic cracking installation (No. 32) for two-stage operation was completed in January of 1977. The raw material (vacuum distillate) is to be cracked in a reactor with ascending catalyst flow (stage I), and the cracking residue boiling over 195 C is to be cracked in a reactor with ascending catalyst flow (stage II), with combined output of the reaction products. The reactor is described, and tables present the results of experimental operation of the installation, qualitative characteristics of vacuum gas oil and residue and the material balance of the cracking process. The installation has been found to be quite flexible. Normal operation of the installation requires assurance of normal operation of the gas section, preventing the C₅ fraction from entering the dry gas, plus adjustment of the operation of the type 380-81-4 centrifugal gas pumps.
[59-6508]

USSR

UDC 665.644.2.013.002.1
66.012

EXPERIENCE OF OPERATION OF THE 1A/1M INSTALLATION AT "ANGARSKNEFTEORGSIINTEZ"
PRODUCTION UNION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 10-12
manuscript received 5 Sep 78

LEVIN, A. I., YERMAKOV, YE. A., ZARUBIN, V. M., Angarsknefteorgsintez
Production Union

[Abstract] The 1A/1M installation of the author's enterprise was put in operation in 1967-1968. For some time, normal operation of the installation was not achieved basically due to unstable operation of the reactor section (frequent failures of catalyst circulation, high levels of coke formation, burning of carbon monoxide in the top zone of the regenerator, etc.). The reactor was significantly redesigned between 1968 and 1974. The following changes stabilized the operation of the reactor section: a type R-2 sprinkler line was installed between the inner and outer tubes of the vertical vessel; three pairs of cyclones in the regenerator were disconnected to increase the stack gas speed; unloading of catalyst from electric filter hoppers was directed into the fluidized bed of the regenerator; the installation was shifted to direct raw material feed; during maintenance cycles, cyclones, transport lines and the vessel are carefully inspected, particularly at the welded joints of the cyclones. The results of operation have confirmed the possibility of using non-superheated steam for catalyst transport, reactor stripping and in the stripping columns, and the possibility of using river water rather than chemically purified water to cool the stack gases.
[59-6508]

USSR

UDC 665.644.2
66.013.004.69
66.012.42.002.235

INCREASING THE POWER AND TRANSITION TO ZEOLITE-CONTAINING CATALYSTS IN
THE CATALYTIC CRACKING UNITS OF GK-3 COMBINED INSTALLATION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 13-14
manuscript received 16 Nov 78

KHADZHIYEV, S. N., KRUGLOVA, T. F., SUMANOV, V. T., Groznyy Petroleum
Scientific Research Institute, Grozgirneftekhim

[Abstract] A plan has been developed to redesign the type GK-3 catalytic cracking installations to increase their capacity by 3%. The resulting increase in vacuum distillate allows the capacity of the catalytic

cracking unit to be increased. The redesign has required the solution of a number of specific problems related to the fact that the reactor is located coaxially beneath the regenerator. The basic changes suggested include: a decrease in the cracking zone in the fluidized bed by installation of vertical barriers in the circular reactor space; creation of additional hydrocarbon desorption zones for the catalysts; regeneration of catalyst in a multisection pseudocounterflow apparatus with the cold coked catalyst fed into the top of the fluidized bed; assurance of good separation of the cracking products by installation of a circulating sprinkler at the top of the column and screen plates at the bottom of the column, improvement of the stabilization unit, including replacement of the S-shaped plates in the absorber with valve-type plates; and compression of cracking gases by the use of one primary and one reserve compressor. The material balance of the cracking process for vacuum distillate is presented. Figures 2.
[59-6508]

USSR

UDC 665.765
665.7.038.5
66.063.942
678.7

WEAR-PREVENTIVE EFFECT OF METAL-CONTAINING DETERGENT ADDITIVES TO OILS THICKENED WITH VINIPOL AND POLYISOBUTYLENE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 p 29-30
manuscript received 18 Oct 78

KAYDALA, YE. V., GUREYEV, A. A., Moscow Institute of Petrochemical and Gas Industry imeni Gubkin

[Abstract] A study is made of the effectiveness of metal-containing detergent additives in oils thickened with polymers. The studies were performed using metal sulphonates, alkylphenylates and alkylsalicylates as well as ash-free additives such as succinimide in low-viscosity type MK-8 oil thickened with polymers: type VB-2 vinipol (molecular mass 9000) and type P-8 polyisobutylene (molecular mass 8000). A four-ball friction was used for long-term testing of the lubricating qualities of the oils. The studies showed that the presence of the polymers in the oil does not change the behavior of the detergent additives. The differences in effectiveness determined were related to the composition and structure of the additives. References 2 Russian.
[59-6508]

USSR

UDC 665.637.73
665.663.4
66.404

EXPERIENCE OF PRODUCTION OF LIQUID PARAFFINS AT THE NOVOKUYBYSHEV REFINERY

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 31-32
manuscript received 20 Nov 79

MILYUTKIN, V. S., TREMASOV, V. A., ISTAMGULOV, V. R., VAKHMYANIN, V. I.,
Kuybyshevnefteorgsintez Production Union

[Abstract] At the Novokuybyshev refinery, liquid paraffins are produced by carbamide deparaffinization of diesel fuels on type 64-1 and 64-2M installations. This article reports the variation in quality of liquid paraffin as a function of the fractional composition of the washing fractions used in the process, which has been on stream for a number of years. The content of aromatic hydrocarbons in the liquid paraffin is reduced by a factor of more than 2 by decreasing the end of boiling of the washing fraction from 192 to 170 C. This lightening of the washing fraction decreases the consumption of washing fraction in the process by a factor of 3-4.

[59-6508]

USSR

UDC 665.635
665.637.73
665.663.4
66-404

SEPARATION OF LIQUID PARAFFINS FROM DIESEL FRACTIONS OF A MIXTURE OF USINSKAYA AND PASHNINSKAYA PETROLEUMS BY CARBOMIDE DEPARAFFINIZATION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 32-33
manuscript received 5 Sep 78

OKHRIMENKO, N. V., MARTYENKO, A. G., BAYBURSKAYA, E. L., Groznyy Petroleum Scientific Research Institute, Grozgirproneftekhim

[Abstract] Results are presented from a study of deparaffinization of the 180-320 C diesel fraction from a mixture of usinskaya and pashninskaya petroleum, taken in a ratio of 4:1, using crystalline carbomide on the G-64 installation. The conditions and results of deparaffinization of the diesel fraction are presented in a table. It is shown that diesel fuel which meets the requirements of State Standard GOST 4749-73 and liquid paraffin meeting the requirements of technical conditions TU 381015375 can be simultaneously produced by this process.

[59-6508]

USSR

UDC 665.727.004.14

MEANS FOR UTILIZATION OF GASEOUS FUELS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 34-35
manuscript received 6 July 78

MATVEYEV, B. I., EPPel', S. A., ARBATSKIY, V. A., Angarsknefteorg. intez
Production Union, INUS

[Abstract] Modern oil refining and petrochemical processes consume large quantities of fuel, frequently more than the end products produced. A study is made of the effect that variation of process furnace parameters has on fuel consumption. It is found that combustion chamber temperatures should be reduced and airflow minimized by recirculation of stack gases in order to reduce the quantities of oxides of nitrogen emitted into the atmosphere while maintaining high efficiency.
[59-6508]

USSR

UDC 541.183.547.313.6.661.183.6

SPECIFICS OF ADSORPTION SEPARATION OF 1-HEXENE FROM MIXTURES WITH n-HEXANE ON NaX ZEOLITE WITHOUT BINDER

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 35-37
manuscript received 2 Aug 78

DOROGOCHINSKIY, A. Z., PROSKURIN, I. L., Groznyy Petroleum Institute

[Abstract] Results are presented from a study of certain process characteristics of the adsorption separation of 1-hexene from a mixture with n-hexane on NaX zeolite granulated without binders. The mixture of 1-hexane and n-hexane was passed through a nonmoving layer of the adsorbant at 0.2 hr^{-1} , with adsorption in the vapor phase at 373 K, air feed rate $48 \cdot 10^{-3} \text{ m}^3/\text{hr}$, time 4 hr. Preliminary experiments established that under these conditions of adsorption, 1-hexene broke through after 47 minutes, equilibrium was reached at 86 minutes. The results indicated that NaX zeolite without binder has high adsorption selectivity for olefin hydrocarbons and low catalytic activity (not over 3% of 1-hexene converted to isomers).
[59-6508]

USSR

UDC 661.7:547.422.23-31
(088.8)

NEW PROCESSES OF SYNTHESIS OF PROPYLENE OXIDE USED ABROAD

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 7, 1979 pp 37-39
manuscript received 16 Nov 78

KAYUMOV, R. P., KHAIMOVA, T. G., Central Scientific Research Institute
for Heat Engineering and Petrochemistry

[Abstract] The development of the production of propylene oxide in the USA and other western countries (West Germany, Britain, Japan) is briefly reviewed. Methods used, yields achieved and the applicable patents are mentioned. References 5: 1 Russian, 4 Western.
[59-6508]

USSR

UDC 553.983:543.8

HYDROCARBONS AND OXYGEN COMPOUNDS IN THE BITUMENS OF KUKERSITE OIL SHALES

Tallin IZVESTIAY AKADEMII NAUK ESTONSKOY SSR - KHIMIYA in Russian Vol 28
No 3, 1979 pp 182-190 manuscript received 27 Oct 78

PAIS, Ruth, KLESMENT, I., POBUL, Linda, Institute of Chemistry, Estonian
Academy of Sciences

[Abstract] This is a continuation of an earlier work which described commercial batches of kukersite in terms of oxidative kerogen destruction. The low concentration of bitumen in the kerogen and its group composition indicate that this bitumen is syngenetic. The authors studied the way in which the bitumen and kerogen are structurally connected. They also analyzed four commercial batches of kukersite and asphaltite, the organic-rich dark-colored layer found in the middle of the kukersite strata. Whereas American studies of Colorado shales containing 10-20% bitumen from organic matter have indicated, based on the identical structures of the bitumen and kerogen that there is a genetic relationship between them, the present study rarely found such structural elements in the bitumen and kerogen. The kukersite contained little bitumen--0.7% of the total organic matter. The authors believed that the different composition of the bitumen and kerogen does not prove that they are epigenetic. Kukersite also fails to follow the rule that the paraffins of ancient shales have $KH \sim 1$ and carbon chains shorter than C_{22} . Figures 5, References 12: 8 Russian, 4 Western.
[60-6508]

STUDY OF THE ORGANIC MATTER OF FUEL SHALE OF THE MANDRA DEPOSIT BY LOW-TEMPERATURE DESTRUCTIVE HYDROGENIZATION

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR - KHIMIYA in Russian Vol 23 No 3, 1979 pp 191-197 manuscript received 26 Oct 78

NAPPA, Lia, KLESMENT, I., VINK, N., KAYLAS, K.

[Abstract] Destructive hydrogenization was used to study the organic matter of Bulgarian fuel shale from the Mandra deposit. Ground shale was treated with 10% hydrochloric acid and extracted with chloroform to determine its material composition. Hydrogenization was performed in a rocking autoclave for 6 hours, with ammonium molybdate applied to the ground shale as a catalyst. Hydrogenization was performed at 330, 360, 390 and 420°C, initial hydrogen pressure 50 atm. Hydrogenization was also performed with the temperature and pressure increasing at three levels from 360°C/25 atm to 290°C/50 atm. It was found that it was much more difficult to hydrogenate this shale than the estonian kukersite shale. The most characteristic structural elements of the kerogen of this shale are long unbranched carbon chains with 10 to 37 carbon atoms. The terrigenous material present in the process of formation of the shale is considered important in determining the properties of the shale. The results indicate that the organic matter of the shale did not experience deep transformation in diagenesis, so that the initial structures of the biologic matter have been retained. Figures 3, References 5: 3 Russian, 2 Western. [60-6508]

USSR

CONTRIBUTION OF VNIINEFTEKHIM TO THE DEVELOPMENT OF PROCESSES OF PRODUCING COMPONENTS OF HEAVY DIESEL FUEL AND AROMATIC HYDROCARBONS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979 pp 3-5

SHILIKIN, V. V.

[Abstract] A summary is given of achievements of VNIINEftekhim [All-Union Scientific Research Institute of Petrochemical Processes] in the area of the production of high-octane components of heavy diesel fuels and aromatic hydrocarbons since its founding in 1929. In the 1950's were created domestic modifications of the catalytic reforming of gasoline fractions and catalysts were created for this process. Catalytic reforming is one of the most important processes in oil refining and in the production of high-octane gasolines. This process is also of great importance in the production of aromatic hydrocarbons, such as benzene, toluene and xylene.

More than half of all the benzene produced in the country is produced in catalytic reforming plants, and more than 90 percent of the toluene and xylene. At the present time in the USSR there are in operation more than 80 plants with an output of from 300,000 to one million tons per year. In 1967 the institute developed a new variant of catalytic reforming for the production of gasoline with an octane number of 95. The AP-64 alumino-platinic catalyst promoted with chlorine was developed for this process. The employment of a chlorinated catalyst required the development of a new technology making it possible to maintain the required chlorine content in the catalyst. In order to improve the catalytic reforming process new more stable catalysts were created, in particular, the bimetallic and polymetallic KR series. The yield of gasoline with an octane number of 95 with these catalysts is five to seven percent greater than with the AP-64 catalyst. The yield of aromatic hydrocarbons is 15 to 20 percent greater with these catalysts. At the present time more than 20 percent of catalytic reforming plants are operating with KR series catalysts. The institute has developed processes for producing high-octane isoparaffinous fuel components, including the isomerization of normal paraffins and selective hydrocracking. In the 1960's a domestic process was developed for the high-temperature isomerization of n-pentane and top gasoline fractions. This process also makes it possible to produce isopentane, the raw material for producing isoprene. The high-temperature isomerization process developed by the institute has competed successfully in the world market. Developed at the institute in recent years is a process for the low-temperature isomerization of paraffins. The advantage of this process is that it takes place under conditions thermodynamically more favorable for the isomerization of alkanes than is high-temperature isomerization. The process utilizes an NIP-74 catalyst at a temperature of 130 to 150°C. At the current time the institute is developing a process for the liquid-phase isomerization of alkanes at 30 to 50°C with superacidic catalysts. This represents a major step forward in the production of high-octane gasolines. Selective hydrocracking has been tested in a commercial plant with a raw material capacity of 100,000 tons per year. This process makes it possible to increase the octane number of reforming process gasolines and to increase their yield. The system developed by the institute makes it possible to produce high-octane motor vehicle gasolines without using an expensive alkylate. The institute is the leading organization in the country in the production of monocyclic aromatic hydrocarbons, including benzene and xylene. The institute has developed a new process for the dealkylation of toluene: by conversion with water vapor, for which no hydrogen at all is required. This process is expensive, however, and the need to improve it has been recognized, in particular, by using as the raw material fractions of highly aromatized reforming gasolines in which paraffins are contained in addition to aromatic hydrocarbons, which are converted with the formation of hydrogen in the process. Another process developed by the institute in recent years, for producing benzene and xylene, includes the reactions of hydrodealkylation, transalkylation and disproportionation of aromatic hydrocarbons, as well as hydrocracking of non-aromatic hydrocarbons. Aromatic hydrocarbons containing at least two carbon atoms in

the side chains, such as ethyl and propyl benzene, are preferentially subjected to hydrodealkylation. As a result, in the xylenes formed ethyl benzene is not contained, which facilitates their separation and isomerization. All the aromatic hydrocarbons contained in the reforming catalysis product are converted into the most valuable products, i.e., benzene and xylene. With the industrial implementation of this process it will be possible to dispense with the separate reforming of narrow- and wide-boiling-range reactions and combine the production of high-octane gasoline and aromatic hydrocarbons in catalytic reforming plants of the same type with a higher capacity. The accomplishments enumerated indicate the great importance of the institute to the industry.
[40-8831]

USSR

UDC 665.642.5

CATALYTIC REFORMING OF GASOLINE FRACTIONS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979 pp 5-14

MASLYANSKIY, G. N., ZHARKOV, B. B., FEDOROV, A. P. and SHAPIRO, R. N.

[Abstract] About 80 percent of the total capacity of USSR catalytic reforming plants is employed to produce motor vehicle gasoline of different types, and this process is very important in the production of aromatic hydrocarbons. Catalytic reforming is used to produce about 60 percent of the benzene and 90 percent of the toluene and xylene in the country. A history is given of the development and improvement of platinum reforming catalysts. Used first were platinum catalysts of the AP-56 type, in which fluorinated aluminum oxide was used as a support. Later were used aluminoplatinic catalysts of the AP-64 type, promoted with chlorine. These catalysts made it possible to increase the octane number of reforming gasoline to 96, because of their better activity and selectivity. The state of the art of the development of the process has involved the development and introduction of highly stable polymetallic catalysts of the KR series. Because their rate of deactivation under the process's conditions is slower than that of monometallic aluminoplatinic catalysts, it has been possible to raise the octane number of reforming gasoline considerably. A higher yield of gasoline and aromatic hydrocarbons is also made possible. The requirements are discussed for the purity of the support. The support employed for platinum catalysts is aluminum oxide of the required physico-chemical properties, i.e., the gamma and eta modifications. In the Soviet Union, for this purpose is used a gamma oxide of aluminum obtained by precipitating sodium aluminate with nitric acid. The aluminum oxide contains various impurities such as oxides of iron and sodium, which considerably worsen the quality of the catalyst. With a too high content of iron impurities in the aluminum oxide, the degree of aromatization of the benzene fraction in the reforming process is reduced. Iron suppresses

one of the most important functions of platinum, i.e., the dehydrogenation of naphthenic hydrocarbons. The contamination of aluminum oxide with sodium results in lowering of its acidity and a resulting reduction in the catalyst's activity. The aluminum oxide support must thus be of high purity. The catalytic properties of the reforming catalyst are improved by even distribution of the platinum in granules of the catalyst. This is made possible by the addition to the H_2PCl_6 solution of another acid, such as acetic acid. The content of platinum in the catalyst influences the rate of the various reactions of hydrocarbons in reforming and also the stability of the catalyst. A platinum content of 0.3 to 0.6 percent by weight in reforming catalysts is sufficient. The influence of the acid promoter is discussed, and it is concluded that it is better to use chlorine as the acid promoter, rather than fluorine. In order to reduce the cracking activity of platinum catalysts in the initial period of operation, which reduces the concentration of hydrogen in the circulating gas and causes the partial coking of catalysts during startup, catalysts are sulfurated by different methods. The size of the catalyst's granules influences the process. The yield of reforming gasoline can be increased substantially by reducing the size of catalyst granules to 1.5 mm. Polymetallic catalysts have been shown to be far superior in terms of stability to the AP-64 catalyst. Various ways of improving the technology are discussed. A system has been proposed for the combined production of aromatic hydrocarbons and a high-octane component of motor vehicle gasoline. This has been made possible with the LCh-35-11/1000 unit, using a polymetallic catalyst. Sulfur containing compounds must be carefully cleaned from the raw material for the successful functioning of platinum reforming catalysts. Hydrodesulfurization units have been provided for this purpose. The unit power of plants has been increased. Since 1970 plants with a capacity of one million tons per year have been in operation, both in the form of self-contained units of the L-35-11/1000 type, and of blocks of combined units of the LK-6u type. The employment of polymetallic catalysts is discussed in terms of the influence of the fraction and hydrocarbon composition of the raw material, the influence of pressure, the production of high-octane gasoline in industrial plants, and the production of aromatic hydrocarbons. Data are given on the catalytic reforming of wide-boiling-range gasoline fractions at low pressure, with the KR-106 catalyst at a pressure of 1.5 MPa and a sulfur content in the raw material after hydrodesulfurization of less than 1 mg/kg. Also are given performance figures for the LCh-35-11/600 plant when employing the KR-104 catalyst, and for the LG-35-8/300 plant when employing AP-64 and KR-104 catalysts. By replacing catalyst AP-64 with catalysts KR-102 and KR-104 and reducing the operating pressure from 1.8 to 2 to 1.4 to 1.6 MPa, the total yield of benzene and toluene increased by 12 to 15 percent. Figures 5; references 27 Russian. [40-8831]

SELECTIVE HYDROCRACKING OF GASOLINE FRACTIONS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 14-17

GEORGIYEVSKIY, V. YU., MASLYANSKIY, G. N., ROZENBLIT, A. B. and SHIPIKIN, V. V.

[Abstract] The selective hydrocracking of gasoline fractions consists in the selective splitting of low-octane normal paraffins and is employed for the purpose of improving the antiknock value of gasolines. Selective hydrocracking is similar to the selectoforming process developed in the USA for raising the octane number of reforming catalysis products. The process of the selective hydrocracking of refining products has successfully passed tests in an industrial plant with a raw material capacity of 100,000 tons per year. The selective hydrocracking of normal paraffins mixed with isoparaffins and cyclic hydrocarbons is performed with bifunctional catalysts based on so-called geometrically selective zeolites. The inlet windows of these zeolites allow molecules of normal paraffins to pass freely into the inside space and react there, whereas molecules of isoparaffins and cyclic hydrocarbons are not admitted. This explains their selectivity. The results are given of a study of the selective hydrocracking of refining products with the SG-1 catalyst, which was used for an experimental industrial test of the process. Hydrogen was used to pressurize the plant, with recirculating hydrogen containing gas. The liquid and gaseous reaction products were analyzed chromatographically. The activity of catalysts was evaluated from the degree of hydrocracking of normal paraffins. Selectivity was determined by the equation $S = K_n \cdot 100 / (K_n + K_i + K_{ts})$, where K_n , K_i and K_{ts} are the number of normal paraffins, isoparaffins and cyclic hydrocarbons subjected to hydrocracking, in percentage by weight. Used as the raw material was a gasoline refining product obtained after the extraction of aromatic hydrocarbons from the reforming catalysis product of the 62 to 105°C fraction in an LG-35-8/300 plant, as well as the fraction of a rigid-condition reforming catalysis product which boils away before 100°C. Discussed individually are the influence of the catalyst, the influence of the bulk feeding rate for the raw material and of the temperature, the influence of pressure, and the influence of the number of times the hydrogen containing gas circulates. The activity of catalysts in the reaction for the hydrocracking of normal paraffins depends not only on their composition but also on the method of preparation. By varying the method of preparing the catalyst it is possible to regulate its activity in the hydrocracking of normal paraffins with chains of different length. It is demonstrated that the selectivity of the process is a function only of the intensity of the hydrocracking of normal paraffins and does not depend on the temperature and bulk rate of feeding of the raw material. In the studies conducted the

depth of conversion of normal paraffins was reduced in proportion to an increase in pressure over the entire range of bulk rates of feeding of the raw material. This is a result which contradicts previous studies and the patterns of normal non-selective catalytic hydrocracking, and requires special study. Selective hydrocracking can be carried out at a pressure of 2 to 4 MPa, making it possible to use existing equipment, in particular, existing catalytic reforming plants. Changing the multiplicity factor for the circulation of gas from 500 to 1500 liters per liter of raw material has practically no effect on the composition and yield of products of the selective hydrocracking of a refined product. In the selective hydrocracking of a gasoline refining product, it is possible to produce the isoparaffin component of a motor vehicle gasoline with an octane number of 76. The yield of useful products, including the high octane-component and the liquid gas, is approximately 96 percent by weight. Figures 3; references 11: 7 Russian, 4 Western.
[40-8831]

USSR

UDC 665.656

CATALYTIC PROCESSES FOR THE CONVERSION OF PARAFFINS AND AROMATIC HYDROCARBONS

Moscow KHIMIYA I TAKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 18-24

BURSIAN, N. R., VOLNUKHINA, N. K., KOGAN, S. B. and SHAVANDIN, YU. A.

[Abstract] Paraffins C_4 - C_6 and C_{11} - C_{18} contained in petroleum have been involved in different oil refining and petrochemical processes developed at VNIINeftekhim [All-Union Scientific Research Institute of Petrochemical Processes]. These hydrocarbons make up approximately seven percent of the content of different oils in the USSR, representing a potential refining volume of about 30 million tons. The dual conversion of C_8 aromatic hydrocarbons and the transalkylation of toluene and aromatic C_9 have been studied at the institute and brought to the industrial planning stage. An experimental verification has been made of the processes of low-temperature isomerization and dehydrogenation of paraffins at the Krasnodar branch of the institute. Discussed individually and in detail are the isomerization of paraffins C_4 - C_6 , the catalytic dehydrogenation of higher paraffins, and the isomerization, disproportionation and transalkylation of aromatic hydrocarbons. The process of the isomerization of paraffins developed in the Soviet Union because of the demand for isobutane, isopentane and high-octane float components of AI-93 motor vehicle gasoline. The process of isomerization is carried out at the present time at five industrial plants with a 53 to 55 percent yield of isopentane for admitted n-pentane and 96 percent by weight for converted n-pentane and an IP-62 catalyst life of

as long as six years. The development of the NIP-74 catalyst made possible a variant of the low-temperature isomerization process which can be carried out at 120 to 200°C with a hydrogen pressure of 3 to 4 MPa. A determination is made of the optimal conditions for the chlorination of the NIP-74 catalyst and of its chemical composition, which equals 0.6 percent by weight of platinum and eight to 10 percent by weight of chlorine. Conditions have been found for the chlorination of the NIP-74 catalyst which make possible minimum heating of the catalyst bed and high isomerizing activity with the minimum formation of gaseous chlorination products. The optimal parameters for the process of the isomerization of n-pentane, n-butane, n-hexane and a pentane-hexane fraction are a temperature, depending on the molecular weight of the paraffin, of 120 to 200°C, a pressure of 3 to 4 MPa, a bulk rate for feeding the raw material of 2 h⁻¹, and a molar ratio of hydrogen to raw material of two. Under these conditions the depth of conversion of normal paraffins in percentage by weight is 50 for n-butane, 75 for n-pentane and 87 for n-hexane. These figures are approximately 1.5-fold higher than those for the high-temperature isomerization using the IP-62 catalyst. In plants for the low-temperature isomerization process, units have been provided for cleaning from the raw material and hydrogen containing gas impurities of sulfur, nitrogen and oxygen containing compounds. Of great interest is the utilization of isomerization products mixed with methyl-tert-butyl ether (MTBE) in preparing non-ethylated gasolines. A gasoline of the AI-93 type can be prepared by mixing reforming gasoline with an octane number of 95 and the isomerization product of a pentane-hexane fraction with an octane number of 83 in a ratio of 1:1 with the addition of five percent by volume of MTBE with an octane number of 115 to 135. By this method it is possible to produce a motor vehicle gasoline with 36 percent by volume of aromatic hydrocarbons. An analysis demonstrates that the most promising process, and one that has important technological and economic advantages, is that of low-temperature isomerization employing an aluminoplatinic catalyst promoted with chlorine. This is the variant which has become widespread abroad and has been approved for commercial introduction in the Soviet Union. The requirements have been formulated for the chemical composition of the catalyst and the structure of the support, as well as the fundamental principles for accomplishing the process, for the catalytic dehydrogenation of higher paraffins. Development of the process of dehydrogenation of C₁₁-C₁₈ paraffins into the respective linear olefins has been related to the problem of utilizing these olefins for the synthesis of biodegradable surface-active substances. Data on the process of the dehydrogenation of higher paraffins are given in a table. A process possessing high selectivity has been created. Thermodynamic features of the dehydrogenation reaction restrict the working pressure to 0.2 to 0.3 MPa and the temperature range to 250 to 500°C. The dehydrogenation reaction is accompanied by the side reactions of isomerization, aromatization and cracking. Selectivity was made possible by the proper selection of the chemical composition of the catalyst and by carrying out the process

with a short contacting period. Two modes of the process have been developed, one making possible a paraffin conversion depth of about 10 percent, and another a raw material conversion of 16 to 17 percent. Increased conversion results in lower selectivity, necessitating higher stability for the catalyst. The increase in conversion to 16 to 17 percent has resulted in an annual savings of about 900,000 rubles per year. Processes for the isomerization of xylenes, the disproportionation of toluene and the transalkylation of aromatic hydrocarbons have been developed because of the demand for benzene and p- and o-xylene, and of the predominance in the products of catalytic reforming of toluene and m-xylene. For the isomerization of xylenes a platinum catalyst is used and the plant is pressurized with hydrogen. The raw material used contains 20 to 22 percent ethyl benzene in addition to xylenes. Catalysts of different acidity are required for the isomerization, disproportionation and transalkylation reactions, and this acidity is regulated by the amount and chemical composition of the mordenite. Figures 1; references 17: 16 Russian, 1 Western.
[40-8831]

USSR

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PRODUCTION OF BENZENE AND XYLENES IN THE 'DEALFORMING' PROCESS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 23-26

RABINOVICH, G. L., MASLYANSKIY, G. N., SELEZNEV, V. D. and GOKHMAN, B. KH.

[Abstract] At VNIINeftekhim [All-Union Scientific Research Institute of Petrochemical Processes] a new process has been developed for producing benzene and xylenes, called "dealforming." The raw material used is catalysis products of the reforming of wide-boiling-range gasoline fractions (60 to 140, 60 to 180 and 85 to 160°C) containing not less than 60 percent aromatic hydrocarbons. Taking place in the process are the reactions of hydrodealkylation, disproportionation, transalkylation of aromatic hydrocarbons, and the hydrocracking of non-aromatic hydrocarbons. Aromatic hydrocarbons containing at least two carbon atoms in the side chains, such as ethyl benzene and ethyl toluene, are hydrodealkylated. The xylenes formed contain almost no benzene, facilitating their subsequent separation and isomerization. The disproportionation and transalkylation of aromatic hydrocarbons take place when the process occurs with the recirculation of toluene or toluene and aromatic hydrocarbons C₉-C₁₀. Paraffins of both a normal and iso- structure present

in the raw material are hydrocracked. In the process takes place the practically total splitting of paraffins C₈-C₁₀, forming azeotropic mixtures with toluene and xylenes. The hydrocracking of paraffins results in the formation chiefly of ethane, propane and butane, whose total yield is eight- to 10-fold greater than that of methane. Reactions take place, each of which is usually carried out as a separate process. A block diagram is shown of the "dealforming" plant. The float fraction, up to 105°C, is skimmed from the reforming catalysis product. This fraction consists mainly of non-aromatic hydrocarbons and benzene in the reforming catalysis product, a 105°C fraction consisting of aromatic hydrocarbons C₇-C₁₀ and five to 15 percent paraffins. This heavy fraction serves as the raw material for the "dealforming" process. The usual hydrogenation method is used, with the recirculation of a hydrogen containing gas. The heavy fraction and the hydrogen containing gas pass through a reactor with a special catalyst pressurized at 2 to 4 MPa at a temperature of 520°C. The benzene fraction is skimmed from the liquid reaction product and, mixed with the head fraction of the reforming catalysis product, is delivered for extraction. Pure combined xylenes are separated by ordinary rectification. Toluene or toluene with unconverted aromatic hydrocarbons C₉-C₁₀ are returned to the process, mixed with the original raw material. A description is given of variants of the process which include the recirculation of different hydrocarbon fractions for the purpose of producing different aromatic hydrocarbons. Three variants are described, consisting of the single-operation variant, recirculation of the toluene fraction, and recirculation of the toluene fraction and aromatic hydrocarbons C₉. The results are given of experiments using these three variants. The products of the first variant are benzene, toluene and xylenes. The second variant makes it possible to increase considerably the yield of benzene and xylenes. The maximum yield of xylenes is achieved by the third variant. In the first variant the yield of benzene is twofold greater and that of toluene 1.25-fold greater as compared with the content of these hydrocarbons in the starting reforming product. In the second variant the yield of benzene is 3.7-fold and of xylene 1.35-fold higher than the content in the starting raw material. In the third variant the yield of benzene is 3.5-fold and of xylene 1.7- to 1.8-fold greater. With combined catalytic reforming and "dealforming," in refining one million tons of the 70 to 180°C fraction of West Siberian oil it is possible to produce about 155,000 tons of benzene and 300,000 to 350,000 tons of xylenes. The purity of combined xylenes from the "dealforming" process extracted by rectification is greater than 99.5 percent. The combined xylenes are made up of 0.5 to two percent by weight of ethyl benzene, 20 to 22 of n-xylene, 48 to 51 of m-xylene and 25 to 28 of o-xylene. Because of the extremely low ethyl benzene content, the content of n- and o-xylene is 10 to 20 percent greater than in combined xylenes from the reforming process. Toluene can be extracted from the "dealforming" products by ordinary rectification, with a purity of 99 to 99.5 percent. Figures 2; references 2 Russian. [40-8831]

SEPARATION OF AROMATIC HYDROCARBONS

Moscow KHIMIYA I TAKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 26-29

GRISHCHENKO, N. F., YABLOCHKINA, M. N., SHAPIRO, L. P. and ROGOZKIN, V. A.

[Abstract] Individual aromatic hydrocarbons of greater purity are required for the production of synthetic fibers, plastics and rubber products. The catalytic reforming of gasoline fractions is the main source of aromatic hydrocarbons. Aromatic hydrocarbons are extracted from catalysis products of reforming and other aromatized raw material by means of liquid extraction with selective solvents, the most widespread of which are polyglycols. A table is shown of the physicochemical properties of anhydrous polyglycols used as extracting agents. Research conducted in the USSR has made it possible to develop an optimal system of extraction making it possible to produce benzene, toluene and xylenes economically and with high efficiency. The raw material used for catalytic reforming consists of narrow-boiling-range gasoline fractions at 62 to 85, 62 to 105 and 105 to 140°C. Processing of the first fraction makes it possible to produce benzene, the second, benzene and toluene, and the third, toluene and xylenes. The addition of reforming-extraction units has made it possible to produce aromatic hydrocarbons suitable for any specialized application. At the current time the output of benzene with extraction plants is about 60 percent of the total output, of toluene more than 80 percent and of xylene more than 50 percent. The growing demand for aromatic hydrocarbons has resulted in the necessity of creating larger-capacity plants. For the purpose of increasing the efficiency of extraction plants it has been necessary to convert to higher-molecular glycols, such as tri- and tetraethylene glycols, in place of diethylene glycol. The effectiveness of tetraethylene glycol is twofold greater than that of diethylene glycol. Research data on phase equilibria form the basis for developing a technology for the process of extracting aromatic hydrocarbons with polyglycols. The key technological indicators are given for the processes of extraction with hydrous polyglycols, as well as data on the extraction of aromatic hydrocarbons from reforming catalysis products. At the current time the process utilizing triethylene glycol has been put into service at nine existing plants. Preparations are under way for converting an existing plant to tetraethylene glycol. For new higher-capacity plants, in addition to extraction with tetraethylene glycol, a process has been developed for extraction with a hybrid solvent based on propylene carbonate. This is called the "Ekstars" process. This process features skimming of the extract without supplying water vapor, washing the solvent off of extraction products by using an anhydrous solvent, and skimming off the recirculation product without supplying

a reflux. The key indicators are shown for the processes of extraction with polyglycols and a hybrid solvent based on propylene carbonate, as compared with Sulfolane. At the present time tetraethylene glycol is best in terms of being able to make the solvent in the necessary amounts and in the time available. Plans have been made for enlarged plants for extracting aromatic hydrocarbons with polyglycols, for the combined production of benzene, toluene and xylenes. The 62 to 140°C fraction of the reforming catalysis product will act as the raw material. The degree of purity of aromatic hydrocarbons is rated on the basis of their content of unsaturated compounds. The raw material for extraction usually contains as much as two percent of these compounds and in the extraction process the main share of these compounds is concentrated in the refining product and as much as 0.1 percent is transferred to the aromatic extract. When the extract is rectified traces of unsaturated compounds end up in the aromatic hydrocarbons and lower their quality. For eliminating the presence of unsaturated compounds, VNIINEftekhim [All-Union Scientific Research Institute of Petrochemical Processes] has developed a process for the selective hydrogenation of reforming catalysis products, and this process is carried out in an additional reactor included in the catalytic reforming system, at 160 to 250°C with an aluminoplatinic catalyst in a combined steam and gas mixture flow at a pressure of 1.5 to 3.5 MPa. The catalyst used for selective hydrogenation contains 0.1 to 0.15 percent platinum applied to unfluorinated aluminum oxide. This process has been introduced at all catalytic reforming plants producing aromatic hydrocarbons. Aromatic hydrocarbons of high quality are produced without the need for additional purification. The need for cleaning sulfur containing compounds from the starting raw material is stressed. The need for a new catalyst is stressed, distinguished by high selectivity and stability in the processing of low-sulfur raw material and ensuring the hydrogenation depth required to produce individual aromatic hydrocarbons and hydrocarbon solvents suitable for modern needs. References 6 Russian. [40-8831]

USSR

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PRODUCTION OF LIQUID FUEL FROM SOLID WASTE

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 29-32

GLEZIN, I. L., PETROV, V. N., TIMOFEYEV, G. A. and BEZMOZGIN, E. S.

[Abstract] An account is given of experiments in and of worldwide know-how gained in the utilization of waste from the production of manmade materials as a source for producing manmade liquid fuel. Treated in particular is the pyrolysis of worn motor vehicle tires to produce liquid products in

the form of resins to be used as furnace fuel oil. The results are given of studies conducted at VNIINEftekhim [All-Union Scientific Research Institute of Petrochemical Processes] on resins produced from the pyrolysis of worn tires, waste from polystyrene production and domestic waste, for the purpose of determining whether the resulting resins meet the standard specifications for liquid fuels. The waste materials were cleaned to remove coarse inorganic inclusions such as pieces of metal and rock and contained in addition to rubber also cloth, wood, paper and other components. The waste material was heated to the required temperature without admitting air and was held isothermically at this temperature until the cessation of gas liberation. The tires and domestic waste were heat treated at 500°C, and the polystyrene waste at 400 to 450°C. The results obtained show that the resins produced from the heat treatment of different waste materials differ considerably both in terms of yield and key physico-chemical indicators. The resin from the pyrolysis of polystyrene waste is a purely hydrocarbon product with an empirical formula of $C_{7.66}H_{7.78}$. In the resin produced from worn tires are contained hetero-elements with a sulfur content of about 0.7 percent. The resin from the pyrolysis of domestic waste has a low sulfur content and a very high oxygen content. All the resins produced have a high content of float and medium-weight fractions. They also have a very low flash point, and therefore they do not satisfy the specifications for furnace fuel oil. The resin from the pyrolysis of worn tires can be categorized as a low-sulfur fuel, but its heavy fraction is somewhat inferior in sulfur content to standard petroleum fuel. Not more than 60 percent of the resin derived from tire rubber and about 70 percent of the resin from domestic waste can be used as furnace fuel oil, since only the heavy fractions of these resins meet the GOST [All-Union State Standard] specifications. The use of heavy fractions alone complicates the process for preparing and utilizing the resins, since they must be fractionated and processed separately into low-boiling-point fractions. It has therefore been proposed that the complete resins be used without preliminary fractionation as an addition to petroleum waste or manmade liquid fuel. The idea is to create from oils and resins not meeting the requirements fuel composites which make maximum use of the best qualities of their components. A brief account is given of the FRG's experience in the joint heat treatment of solid fuel and waste to produce composites of this type. In the USSR studies have shown that the resin yield can be increased by heat treating a mixture of shale with rubber waste products. By semicoking mixtures of shale with a combustion heat of 10.5 and 8 MJ/kg containing 10 and 25 percent rubber, respectively, it is possible to achieve the same resin yield as from high-quality shale with a combustion heat of 13.4 MJ/kg. Tests made at VNIINEftekhim and the "Slantsy" [Shale] Plant have demonstrated the feasibility of combined heat treatment of shale and rubber waste in a commercial producer furnace. Crushed worn tires are well suited for this process, inasmuch as it is necessary to use waste with a bulk density of 600 to 700 kg/m³ in pieces measuring not greater than 100 mm. It is suggested that worn tires be gathered and processed

centrally. The savings resulting from the erection of a special plant for the pyrolysis of worn tires will pay back the cost of transporting them. References 9: 6 Russian, 3 Western.
[40-8831]

USSR

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CHEMOMOTOLOGICAL SOLUTIONS TO THE PROBLEM OF FUEL RESOURCES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 35-38

PISKUNOV, V. A., CHERNOVA, K. S., MIKHEICHEV, P. A., YURUKOVSKIY, N. P.
and ZRELOV, V. N.

[Abstract] A study is made of the feasibility of lowering the requirements for the quality of aircraft fuels for the purpose of making broader use of their resources. It is demonstrated that it is necessary to disclose the interrelationship between the properties of fuels, the quality of aircraft equipment and the conditions for its employment, i.e., to carry out extensive chemomotological research. The special science of chemomotology, concerned with the theory and practice of the efficient utilization of fuel, make it possible to expand fuel resources for jet aviation by altering the structure of the balance of petroleum products produced from a unit volume of crude. It is impossible to increase the yield of aviation kerosene from crude without some worsening of the kerosene's quality; it is therefore necessary to increase the degree of adaptability of aircraft equipment to fuels of reduced quality. To expand the potential content of jet fuel fractions, a thorough analysis is required of the extent of the change in yield and quality of other motor fuels. The problems which arise in expanding the resources of jet fuels by altering the structure of the yield of petroleum products can be solved by raising the cloud point of fuels and the content of aromatic hydrocarbons in them. It is shown that it is possible to increase the yield of jet fuel from crude at the expense of reducing the fuel's quality and the yield of other petroleum products. The results are given of tests made by English firms for the purpose of determining the feasibility of the large-scale employment of fuel with an elevated cloud point. These tests established the actual temperatures of the fuel in the tanks of aircraft during long flights on major air routes and made a precise determination of fuel indicators which most precisely determine the efficiency of the fuel system and engine at below-zero temperatures. It was demonstrated that for the purpose of improving the safety of flights utilizing equipment with inadequate chemomotological reliability it is necessary to modify the conditions for the operation of this equipment. For example, for a Boeing 747 equipped with a fuel filter heat shield system it is recommended that flight conditions be

changed with respect to speed and altitude when the temperature of the fuel in the tanks is 3°C above the cloud point. When using fuel with a cloud point of -40°C , for a safe flight the M number must equal 0.84 if the predicted temperature of the outside air at the flight altitude along the route is from -62 to -66°C . When the temperature of the outside air is from -66 to -70°C it is suggested that a flight altitude be chosen which has a higher outside air temperature, without changing the M number. It has also been demonstrated that the fuel's cloud point does not completely characterize the behavior of the fuel in aircraft systems at low temperatures. Cavitation operating modes of booster pumps begin at fuel temperatures below the cloud point. A description is given of a method and instrument developed by Shell Oil for measuring the "cold flowability" of fuel. The permissible temperature for the safe employment of cooled fuel with an elevated cloud point is that at which the cavitation mode of pumps begins because of clouding of the fuel after 70 percent of its volume has been pumped. The instrument employed to test the suitability of fuel consists of two chambers separated by a valve. The fuel to be tested is poured into the top chamber and the instrument is immersed in a vat with a coolant. At a certain temperature the valve opens and the unclouded fuel flows from the top chamber into the bottom. The suitability of the fuel is determined from the amount of fuel left. By this method an estimate was made of the influence of paraffins on the low-temperature properties of Jet A-1 fuel, and it was shown that with an increase in the content of these hydrocarbons the range of application of this fuel is narrowed considerably. An increase in the content of aromatic hydrocarbons in the fuel involved the danger of overheating of the walls of fire tubes under the influence of heat from the flame. Tests have shown that with an increase in the content of aromatic hydrocarbons in Jet A-1 fuel from 20 to 22 percent by volume the temperature of a fire tube's wall is raised by less than 10°C , which does not lower the reliability of the combustion chambers of modern gas turbine engines. Studies by General Electric have shown that with an increase in the content of aromatic hydrocarbons from 15 to 25 percent by volume the walls of fire tubes cannot be heavily overheated, but with an increase in this content to 35 to 38 percent the temperature conditions for the operation of chambers are complicated considerably and harmful emissions in exhaust gases are increased drastically. It is concluded that it is necessary to improve the design of combustion chamber fire tubes for the purpose of using these fuels in aircraft engines. Figures 3; references 8: 4 Russian, 4 Western.

[40-8831]

CHEMICAL STABILITY OF HYDROREFINED FUELS AND THEIR STABILIZATION BY ANTI-OXIDANTS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 38-41

SABLINA, Z. A., TISHINA, YE. A., YEGOROVA, K. A. and YERMAKOVA, T. I.

[Abstract] In the process of hydrotreating modern fuels, along with undesirable components are removed also natural inhibitors of oxidation. The results are given of a study of the oxidizability of samples of new types of jet fuel produced by employing hydrotreating and hydrogenation, and of the effectiveness of commercial antioxidants in chemical stabilization of these fuels. The method of investigation employed was the repeated oxidation at 120°C of the same portion of fuel. One hundred and ten milliliters of fuel were poured into the container of an instrument for determining the corrosion activity of fuel, the fuel was heated to 120°C, and the container was connected by means of a ground-glass joint to a reflux condenser. Four containers with the same fuel were placed in the instrument at the same time. The fuel was held at this temperature for six hours in four steps, between which the instrument was shut off. At the end of each step an estimate was made of the degree of oxidation of the fuel and a determination was made of its peroxide number, optical density, acidity and gum existent content. The peroxide number was determined by potentiometric titration with a 0.1 N solution of $\text{Na}_2\text{S}_2\text{O}_3$ of a weighed quantity of the sample in a solvent. Optical density was determined with a model FEK-56 photoelectric calorimeter-nephelometer with a standard iso-octane as the reference. Acidity was determined by the modernized ASTM D 974 method, in which the sample was dissolved in a mixture of toluene and isopropyl alcohol containing a slight quantity of water and the single-phase solution produced was titrated at room temperature with a 0.1 N solution of KOH in the presence of an indicator until the yellow color became pinkish red. The gum existent content was determined according to GOST [All-Union State Standard] 1567-56. IR spectroscopy was also employed, making it possible to observe the kinetics of the accumulation of the end products of oxidation from the absorption bands for C=O, C-O and O-H bonds. Subjected to study were fuels T-6, T-8 and RT. Under the conditions of the experiment, both intensely hydrogenated fuels (type T-6) and hydrotreated fuels (types T-8 and RT) oxidized considerably. The results demonstrate that the tendency toward oxidation which has been observed in jet fuels is characteristic of hydrotreated and hydrogenated fuels of practically all modern types. Under mild conditions these fuels oxidize with the formation of soluble products; therefore it is necessary to stabilize them with antioxidants. Studies were made of major commercial fuel antioxidants belonging to different classes of chemical compounds. A study was made of the relative effectiveness of antioxidants in the stabilization of fuels T-6 and T-8

by the same method used for determining the oxidizability of these fuels without additives. The results demonstrate that all the domestic and foreign antioxidants studied effectively stabilize these fuels. The intensely hydrogenated fuel T-6 is more difficult to stabilize than hydrorefined fuel T-8. The best results were obtained with the antioxidants 2,6-di-tert-butyl phenol (Topanol'O), 2,4-dimethyl-6-tert-butyl phenol (Topanol'A) and 1,1,3-548s(2-methyl-5-tert-butyl-r-oxyphenol\ butane (Topanol'CA). Tests also demonstrated that the minimum effective concentration of antioxidants can be reduced, in particular for the least stable type T-6 fuel, to 0.001 to 0.002 percent by weight. It is concluded that it is feasible to stabilize with antioxidants all modern hydrorefined and intensely hydrogenated fuels. Figures 4; references 9 Russian. [40-8831]

USSR

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SEPARATION AND UTILIZATION OF ACETYLENE AS A BY-PRODUCT OF OLEFIN PRODUCTION

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 41-43

BEREZHNYAYA, K. P., BYSTROVA, T. A., ZELENTOVA, N. I., AVREKH, G. L. and SHAMRAY, O. B.

[Abstract] From 0.1 to 0.8 percent by weight of acetylene is contained in the pyrolysis gas, depending on pyrolysis conditions and the composition of the hydrocarbon raw material. At the gas separation stage practically all the acetylene goes into the ethane-ethylene fraction, where its content is 0.4 to 2.2 percent by weight. The refining method employed in industry is based on the selective hydrogenation of acetylene, which results in the destruction of acetylene as a commercial product. The acetylene lost is negligible in small units, but becomes considerable in large-capacity olefin plants. In a plant with a capacity of 300,000 tons per year, working on gasoline, as many as 20 kg of acetylene per one ton of ethylene are formed, or 6000 tons per year. It is recommended that for existing and future olefin production processes, commercial acetylene be extracted from the ethane-ethylene fraction by using dimethyl formamide as a solvent. The acetylene is extracted in two stages, at the first of which the acetylene is absorbed from the ethane-ethylene fraction at a pressure of 2.8 MPa at -10°C with subsequent desorption at a pressure of 120 kPa. The gas stream enriched with acetylene leaves the desorber and enters the second stage of the process, in which acetylene is extracted in an absorber at a pressure of 120 kPa and at -7°C . The saturated solvent is sent to the desorber, in which under the same pressure a commercial acetylene-ethylene fraction containing up to five percent by volume of ethylene is eliminated. For the purpose of safety in

extracting acetylene, it is recommended that only the first stage of the system be installed in the area of the olefin complex, and the second, in which concentrated acetylene is produced, beyond the limits of this area. It is recommended that the acetylene by-product be used in the gas flame treatment of metals. Ethylene plants are located in all industrially developed regions of the country experiencing an acute need for acetylene. The extraction of acetylene as a by-product would make it possible to reduce the consumption of scarce calcium carbide. Acetylene derived from olefin production products does not require additional cleaning. The imputed costs of the production of commercial acetylene with olefin plants are almost three- to fourfold lower than for producing carbide acetylene with stationary gas producers. The production cost of acetylene as a by-product of olefin production is 1.5-fold lower than with the most advanced method, the pyrolysis of natural gas. It costs about the same to produce acetylene as a by-product of olefin production as it does for the process of hydrogenation of acetylene. References 8: 5 Russian, 3 Western.
[40-8831]

USSR

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DISPERSED STRUCTURE OF THE CARBAMIDE COMPLEX IN THE PRODUCTION OF LIQUID PARAFFINS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 43-45

KHROMYKH, V. F., SPITSYN, V. I., TARAKANOV, V. S., KRISTAL'NAYA, M. S., KARAMYSHEV, M. S., SAMOKHVALOV, A. I., BROITMAN, A. Z., and SHESHENINA, Z. YE., USSR Academy of Sciences Institute of Physical Chemistry and Novo-Yaroslavskiy NPK [Petroleum Products Complex]

[Abstract] A study of the structural-mechanical, filtration, adhesion and other physicochemical properties of the carbamide complex is important because these properties to a considerable extent determine the technology and equipment used in the deparaffination of fuels. The results are given of measurements of the dispersed (granulometric) structure of the carbamide complex by the sifting, filtration, sedimentation and electron microscopy methods. Commercial samples of suspension were studied from the Novo-Yaroslavskiy NPZ [Petroleum Products Plant] complex, selected from the Ye-1, T-6/1, Ye-2, Ye-3/1, Ye-3/2 and Ye-3/3 units of the G-64 plant. Also studied was the original carbamide. Sifting was performed with a 028M sieve analyzer. Fifty grams of powder dried at 50°C were poured into the upper sieve and sifting was considered complete when in 2 min the weight of the powder in the sieve changed by not more than 0.5 percent. The results of the sieve analysis are expressed as a percentage of the content of each fraction. Filtration analysis was performed

with an FFAN-27 unit designed by the USSR Academy of Sciences Institute of Physical Chemistry. The suspension was put into a 1 cm² filtering cell, left for 15 min, and the residue was compacted by a moving piston with a porous diaphragm. A mild solvent, BR-1 benzine and acetone, was filtered through the compacted residue at a steady pressure. The equivalent diameter of particles was calculated by the familiar equations. Sedimentation analysis was performed by the method of continuous weighing of the sediment in the pan of a VT-500 torsion balance. The suspension was placed in a measuring beaker and diluted with a mild solvent so that the concentration of the solid phase in the suspension would equal 0.1 to 0.25 percent. The readings of the torsion balance were recorded for 2 h. Sedimentation curves were analyzed analytically by plotting a distribution curve. An IEM-120 Japanese scanning electron microscope was used to take electron microscope photographs of particles of the complex. Magnifications of 1000, 3000 and 10,000 were employed. Differential and integral distribution curves are given for particles in terms of size in the initial carbamide, according to the data of sieve analysis. Close results were obtained for all the methods of analysis employed. The dispersed structure of the initial carbamide obeys a log-normal distribution law for particles in terms of size. It was assumed that the degree of dispersion of the product produced as the result of crushing does not depend on the absolute dimensions of particles of the original material. In the C-64 plant mechanical crushing of the carbamide does not take place over a long period; the dimensions of particles of the initial carbamide are 100 to 400 microns (91.2 percent), the mean size of particles is 208 microns and the distribution median is 214 microns. It is necessary that dispersion analysis be performed under conditions excluding the influence of coagulation. In analyzing the ratio of the length to the diameter of particles, the electron microscope method gives the most accurate results. The data demonstrate that the sediment of the carbamide complex comes under the heading of a system with relatively high dispersion and small particles. A system of this type has high adhesion and adsorption properties. The dimensions of particles of this complex have a heavy influence both on the completeness of the separation of phases in a centrifugal field or in filtration and on the purity of paraffins separated from the complex. The fineness of the crystals of the complex and the surface phenomena associated with this account for difficulties encountered in the C-64 plant at the Novo-Yaroslavskiy NPZ. These include the fact that when the complex is flushed the necessary degree of separation of paraffins and aromatic hydrocarbons is not achieved, the sediment has a great tendency to stick, thus hindering separation of the suspension in centrifuges and hydraulic cyclones, and the transportability of the suspension is inadequate. Figures 3; references 6 Russian.
[40-8831]

MOLECULAR WEIGHT AND COMPOSITION DISTRIBUTION OF COPOLYMERS OF ISOBUTYLENE WITH DICYCLOPENTADIENE AND ALPHA-METHYL STYRENE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 10, 1979
pp 47-49

AKHMEDOV, A. I., LEVSHINA, A. M. and SADYKHOV, Z. A., Azerbaydzhan SSR
Academy of Sciences Institute of Chemical Physics

[Abstract] The results are given of a study of the molecular weight and composition distribution of copolymers used as viscous additives for the purpose of thickening oil. A key requirement for viscous additives is homogeneity in their molecular weight and composition with a specific mean molecular weight. The additives currently used, polyisobutylene, in particular, are subject to destruction under the influence of thermal and mechanical effects, resulting in a reduction in the viscosity of the oils thickened by them under conditions of use. The additives studied are modified polyisobutylenes produced by the copolymerization of isobutylene with dicyclopentadiene and alpha-methyl styrene. The addition of dicyclopentadiene and alpha-methyl styrene links to the polyisobutylene chain results in, as it were, polyalkyl derivatives of carbocyclic and aromatic hydrocarbons with better resistance to thermal oxidation and mechanical effects than hydrocarbons with an open chain. The method of fractionation by fractional precipitation was employed to investigate the molecular weight distribution of these copolymers. Hexane was used as a solvent and isopropyl alcohol as the precipitator. The concentration of copolymers in the solution equaled one percent. Integral and differential curves are presented for the distribution of copolymers by molecular weight. The data obtained were used to calculate the coefficient of the molecular weight inhomogeneity, U , equaling the ratio of the mean-weight molecular weight to the number-average. Copolymers of isobutylene with alpha-methyl styrene are characterized by a relatively broader molecular weight distribution, $U = 1.77$, than copolymers of isobutylene with dicyclopentadiene, $U = 1.59$. Both copolymers have a narrower molecular weight distribution than does polyisobutylene, for which $U = 2.91$. A study was also made of the molecular weight distribution of copolymers after destruction, for the purpose of explaining the nature of the change in the molecular weight of copolymers during thermal and mechanical effects in an oil solution. Under these conditions, first subjected to destruction are macromolecules of relatively high molecular weight, resulting in a reduction in molecular weight inhomogeneity, for fractions with closer molecular weights accumulate in the copolymer. For example, the main share of fractions of the initial copolymer of isobutylene with dicyclopentadiene belongs to molecules with a molecular weight of 5000 to 15,000, and after mechanical destruction to molecules with a molecular weight of 2000 to 9000, and after thermal destruction of 3000 to 12,000. Since the composition distribution of copolymers also

determines their physicomachanical properties, an investigation was made of this distribution by the method of adsorption chromatography employing grade ASK silica gel. Fractionation was performed in a three-stage column filled with silica gel, with the weight ratio of copolymer and silica gel equaling 1:20. Elution was performed with solvents with increasing polarity. After removal of the solvent, a determination was made in fractions of copolymers of the number of dicyclopentadiene links, by the bromine number method, and the alpha-methyl styrene links by the UV spectroscopy method. Integral and differential distribution curves are presented. The results show that copolymers of isobutylene with dicyclopentadiene and alpha-methyl styrene are close in composition. Therefore, the composition inhomogeneity of macro-molecules cannot cause a difference in the behavior of these copolymers during destruction. The composition of the copolymers studied does not change in thermal and mechanical destruction. When dicyclopentadiene and alpha-methyl styrene links are added to the polyisobutylene chain, products are formed which are more homogeneous in terms of molecular weight than is polyisobutylene. This explains the advantages of these copolymers over polyisobutylene. Figures 3; references 7: 6 Russian, 1 Western. [40-8831]

USSR

UDC 66.012.46

STATE OF THE ART OF THE PROCESS OF STEAM CONVERSION OF HYDROCARBONS AND
POSSIBILITIES FOR INTENSIFYING IT (SURVEY)

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 5, 1979 pp 29-34 manuscript
received 6 Apr 78

IL'YENKO, B. K., Ukrainian SSR Academy of Sciences Institute of Gas
Utilization

[Abstract] A survey is given of worldwide progress in the area of mastery and improvement of the process of catalytic steam conversion of hydrocarbons, which is the chief method of producing hydrogen-containing gases for the production of ammonia, methanol and industrial hydrogen. The development of the process is due to the 1.5- to 2.5-fold climb in the production of hydrogen on a worldwide basis projected by 1980 as compared with 1970. The production of ammonia and methanol in the Soviet Union will have climbed two- to threefold during the same period. A history of the development of the process and equipment used is given, starting with the beginning of the 50's, when the process was accomplished for the first time under pressure. The increase in pressure in conversion furnaces became possible because of the development of new refractory materials and the mastery of the technology for fabricating tubes by the centrifugal casting method. The basic designs for tubular furnaces became

established by the beginning of the 60's. Widespread in the industry are furnaces of the direct flow type equipped with jet burners located in the crown. Heat is transmitted to the reaction tubes chiefly by radiation from smoke gases. In these furnaces the smoke gases and steam-and-gas mixture in the tubes move in the same direction and the temperature of the smoke gases is lowered along the way. This makes it difficult to maintain optimal temperature conditions along the length of the tubes and it becomes possible for the tubes to overheat in the inlet section. The chief source of raw material for the process remains natural gas. Conversion catalyzers are being improved by reducing their hydraulic drag and improving their mechanical characteristics. A nickel catalyzer for the conversion of natural gas developed at the Ukrainian SSR Academy of Sciences Institute of Gas Utilization has high longterm strength and resistance to heat loads. A major trend in development of the process has been an increase in the capacity of plants. The capacity of conversion furnaces with burners arranged horizontally is 50,000 to 60,000 tons of hydrogen per year, which is believed to be the limit for this type of furnace. Furnaces of the direct flow type have reached a capacity of 100,000 to 120,000 tons per year of hydrogen in the production of ammonia. The largest conversion furnace is owned by the Japanese, with a capacity of 170 tons of ammonia per 24-h period. Plans are being made to construct even larger furnaces. Conversion furnaces nevertheless have fundamental shortcomings which are difficult to overcome. These concern chiefly the exceptionally severe operating conditions for reaction tubes. The wall temperature of tubes reaches 1000 to 1050°C with normal operation. This is close to the maximum for the metal's yield point at pressures of 20 to 40 atm. Grade HK-40 steel is usually used for making reaction tubes; the Soviet analog of this is grade 45Kh25N20S2 steel. One of the reasons for the shutdown of tubular furnaces is the bursting of reaction tubes, which accounts for 53 percent of all shutdowns. One study shows that shutdowns occurred for this reason in 78 percent of all units after six years and more of operation. The specifications for the operating conditions of tubes account for the low intensity of the conversion process in modern furnaces. This intensity has reached its limit for materials which have been mastered. HK-40 steel is highly sensitive to overheating. A major trend in recent years in the improvement of tubular furnaces has been the development of new grades of flame-resistant steel for making tubes and other stressed elements of furnaces. It is believed that HK-40 steel will remain the basic material for reaction tubes for some time, inasmuch as the new steels are much more expensive; Supertherm costs twice as much as HK-40. An analysis is made of the state of the art of the process of the steam conversion of hydrocarbons in tubular furnaces and it is demonstrated that the possibilities for intensifying this process have practically reached their limit. The most promising trend in the development of this process is the search for methods of intensifying the delivery of heat to the catalyst bed. One way to solve this problem is to employ a fluidized catalyst bed. The results are discussed of studies made along this line. The results are given of studies employing the principle of supplying heat to a fluidized catalyst

bed through the wall of the equipment or the tubular surface. In tests of a reactor designed by GIAP [State Scientific Research and Design Institute of the Nitrogen Industry and Products of Organic Synthesis] with an inside diameter of 150 m, the coefficient of heat transfer from smoke gases equaled $1000 \text{ kcal/m}^2 \cdot \text{h} \cdot \text{deg}$. The employment of tubular reactors with a fluidized bed in large conversion plants in all probability involves considerable engineering difficulties. In a process developed by the USSR Academy of Sciences Institute of Petrochemical Synthesis and the Ukrainian SSR Academy of Sciences Institute of Gas Utilization, the heat required for the conversion reaction is supplied to a reactor with a fluidized catalyst bed by means of a solid circulating heat transfer agent. This agent imparts its heat to the catalyst and as a result of the difference in the specific gravity and dimensions of particles it is separated through the fluidized bed. The heat transfer agent is fed pneumatically from the reactor into a heater, where it is heated to 1000 to 1100°C with the combustion of natural gas in the fluidized bed. The heat transfer agent thus circulates continuously through a loop consisting of the heater, reactor, pneumatic transport line, and the heater again. Results of studies of this unit have shown that the intensity of the process is 10- to 20-fold higher than in tubular furnaces. The high intensity of the process makes it possible to develop equipment of relatively small size. Low-alloy steel can be used to make this equipment. It is also possible to carry out the process by using as a heat transfer agent a material which absorbs CO_2 directly in the reactor, thus resulting in deeper conversion of hydrocarbons with a simultaneous lowering of the temperature in the reactor by 150 to 200°C. The adoption of this process requires a great deal of engineering work since there has been no practical experience in carrying out high-temperature processes in a fluidized bed under pressure with a separating heat transfer agent. Figures 1; references 50: 23 Russian, 27 Western. [41-11,176]

USSR

UDC 66.094.197.3:001.5

METHOD OF DISCHARGING THE CATALYST FROM A TUBULAR FURNACE FOR THE PRIMARY REFORMING OF METHANE

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 5, 1979 pp 36-37 manuscript received 17 May 79

DENBNOVETSKAYA, YE. N. and KRAVTSOV, A. I., Ukrainian SSR Academy of Sciences Institute of Gas Utilization

[Abstract] Difficulties in discharging the exhausted catalyst from the tubes often occur when using tubular furnaces for the primary reforming of natural gas in the production of ammonia. Catalyst granules become wedged in a tube, become clumped together, or the catalyst breaks down.

The results are given of studies of a laboratory unit for discharging the catalyst from the tubes by means of a vibrating metal rod. The vertical rod had an inside diameter of 78 mm and was 600 mm high. The catalyst was loaded into the tube and compacted by knocking the side walls of the tube until maximum settling was achieved. Various catalysts were used, including KSN-20, KSN-15, GIAP-16 and a Czech oxal-nickel catalyst. The respective heights of the catalyst bed were 286 mm, 190 mm, 190 mm and 600 mm. The vibrator had a vibration rate of 50 Hz, a vibration width of 1 mm and a power of 30 W. Each catalyst was loaded 10 times into the tube and the tube's wall was vibrated for two minutes. The tube was then lifted and a determination was made of the extent of sticking of the catalyst. Then the vibrator was applied to the wall of the tube and a determination was made of the time required to totally empty the catalyst. The vibrating rod was inserted into the tube as far as was required to empty it. Attempts were also made to empty the tube by striking its wall. Full-scale tests were also made in an industrial plant, in which the KSN-2 catalyst was loaded into reaction tubes which were subjected to extreme overheating. The usual poking method took several men 30 min to empty the tube. When employing the new method a single man emptied the tube in 2 min. The new method, in addition to its speed, has the important advantage that there is no danger of harming the welded joints between tubes and the collector. This damage is possible with the other methods of hitting the tubes with a mallet and vibrating them.

[41-11,176]

NEW WATER TREATMENT METHODS

Moscow IZVESTIYA in Russian 1 Nov 79 p 1

[Article by S. Tsikors: "The Second Life of Water"]

[Text] The scientists of the Ukrainian Academy of Sciences proposed a new approach to the purification of tap water as well as the restoration and recycling of technical and industrial effluents.

This novel approach to the problem was made possible by an original theory developed by the academician of the Ukrainian Academy of Sciences, L. Kul'skyy. Water impurities were classified by their so-called phase dispersion states, and separated into several groups. Standard water purification blocks have been developed for each group of impurities. Regardless of how complex an industrial effluent was, water could be recycled, and its clarity restored, once it has been passed through the standard purification blocks assembled in a certain order, tailored to the composition of the impurities.

The apparatus and purification methods suitable for block design of water purification plants was developed at the Institute of Colloidal Chemistry and Water Chemistry, UkrSSR Academy of Sciences, where L. Kul'skyy heads a section. Both the apparatus and the purification methods were tested under production conditions at water supply stations and in industrial plants. They proved to be excellent. Standard purification blocks made it unnecessary to design and build individually customized purification installations.
[66-7813]

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USSR Report

CHEMISTRY

No. 71

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7 July 1980

USSR REPORT

CHEMISTRY

No. 71

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PESTICIDES

UDC 547.562; 632.934

SYNTHESIS OF ANALOGS OF A JUVENILE HORMONE 2. ALKYLATION OF SUBSTITUTED PHENOLS BY GERANYLDIMETHYLPHENYLAMMONIUM CHLORIDE

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR-SERIYA KHIMIYA in Russian No 4, 1979 submitted 26 Feb 79 pp 257-260

KOGERMAN, A., AMMON, KADRI, RANG, H. and LAATS, K., Estonian SSR Academy of Sciences Institute of Chemistry

[Abstract] A method of synthesis of substituted phenyl geranyl ethers based on synthetic geranylchloride and produced by reactions of telomerization of isoprene was discussed. Geranylchloride was isolated from products of the reaction of telomerization by selective conversion under the effect of dimethylaniline in a quaternary ammonium salt, which uses for alkylation corresponding substituted phenols in an aqueous medium in the presence of NaOH. Eleven phenyl geranyl ethers were produced by this method. References 14: 10 Russian, 4 Western.
[80-2791]

UDC 632.954:633.8

THE DETERMINATION OF TRIAZINE HERBICIDES IN ESSENTIAL OILS AND IN PLANTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 57-59

BARANOV, YU. S. and KHILIK, L. A. [All-Union Scientific Research Institute of Essential Oil Cultures] and KLISENKO, M. A. [All-Union Scientific Research Institute GINTOKS]

[Abstract] A sensitive method was developed for the detection and determination of atrazine, symazine, igran and prometrin in essential oils from lavender, mint, sage and coriander, based on phase distribution chromatography, coupled with gas chromatographic readout. A sample of the essential oil was dissolved in a polar solvent (nitromethane, DMFA, acetonitrile, DMSO), 10 ml of 1 N HCl, 50 ml distilled water and 15 ml NaCl solution were added, the

mixture was shaken in a separatory funnel with a 7:1 mixture of a n-hexane-diethyl ether. The aqueous layer was made alkaline with 1 N NaOH (to pH 8-10) and extracted with chloroform. The purified residue was gas-chromatographed on a Tsvet-106 apparatus equipped with a thermoionic detector. Sensitivity of this method is 0.1-0.2 mg/kg. References 14: 4 Russian, 10 Western. [44-7813]

HEXATHIURAM-SEED TREATMENT AGENT

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 30-31

ANDREYEVA, YE. I., All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] To control surface type wheat and rye smut, 80 percent hexathiuram solution is recommended. It is effective against various mildew fungi and root rot fungi of the sugar beet. It is a contact activity agent. It does not penetrate into the germinating seeds. The potency of hexathiuram is maintained for 30-35 days in the soil, in a wide range of pH values. It is detoxified by soil colloids and microflora; it is safe with respect to the surrounding medium. The seeds may be treated with hexathiuram up to one year before planting. Digested seeds should never be used for feeding. Hexathiuram is toxic and flammable; an air-dust mixture may be explosive. It should be stored in sealed containers. It retains its activity for up to two years. No references. [44-7813]

THE USE OF RAMROD IN CHEMICAL WEEDING OF SOYBEANS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 35-37

VESELOVSKIY, I. V. and ZHEREBKO, V. M., Ukrainian Agriculture Academy

[Abstract] Ramrod (N-isopropyl-N-phenylchloracetamide) was evaluated in field tests as a chemical weeding agent on soybean fields. Ramrod, used in 6-10 kg per hectare doses, cleared the soybean beds from annual weeds throughout the vegetative period. The effectiveness of ramrod depended on the rainfall, decreasing with increased precipitation. The yield of the beans exceeded the control levels by 19.4-59.2 percent. Only the wild radishes, wild buckwheat and pigweeds were resistant to ramrod. References 8: 6 Russian, 2 Western.

[44-7813]

COMPATIBILITY OF BIOLOGICAL PREPARATIONS WITH INSECTICIDES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 54-56

ZAYATS, YU. V. and KISELEK, YE. V., Lazarev Parasitorium, All-Union Institute of Plant Protection

[Abstract] The complex systems of plant protection include combinations of biological preparations mixed with insecticides. In such systems, the toxic effects of the insecticides towards the microorganisms must be considered. A number of chemical agents was evaluated under laboratory conditions. It was shown that chlorophos, phozalon, sevin and dilor had practically no toxic effect on bacillus thuringiensis and beauveria bassiana for a period of 6 hrs. After 24 hrs, a ten-fold decrease of cells was observed. A mixture of 0.1 percent boverine with 0.05 percent technical chlorophos remained toxic towards the colorado beetle for 24 hours after the preparation. References 12: 5 Russian, 1 Hungarian, 6 Western.

[44-7813]

INSECTICIDES AGAINST SUGAR BEETS CUTWORM

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 22-26

MARKOV, F. I. and ISAKULOVA, D. I., Kirgiz Experimental-Selection Station for Sugar Beets

[Abstract] The aim of this study was to determine the effectiveness of granular insecticides in controlling sugar beet cutworm, to test some new preparations and to determine the most practical schedule for the application of pesticides. It was shown that the best period for the application of insecticides is during the initial development of the grub. At that period the following agents were found to be effective: -isomer of HCCH, bazudin, valexon, phosphaman, chlorophos and dilor. Spring application was ineffective. Late application of bazudin and valexon followed by phosphaman and chlorophos were also effective. At the adult stage of development, only bazudin showed any effect. The granulated insecticides may be applied by covering the entire field, or by local row application, next to the plants. None of the agents used had any detrimental effects on the quality of the sugar beets; the yield, sugar level and the quality of juice were not affected. References: 10 Russian.

[44-7813]

COOPERATION AMONG THE SEV (SOVIET OF ECONOMIC ASSISTANCE) MEMBERS IN THE DEVELOPMENT OF MINERAL FERTILIZER INDUSTRY

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 7-10

SHARKOV, L. Z.

[Abstract] The Soviet of Economic Assistance coordinates the efforts of its members in the development of agriculture, in dissemination of technical progress and evaluation of the industrial achievements. An important role is played by the standing commission on chemical industry, and within it, by the working group on mineral fertilizers, which is concerned with the production of mineral fertilizers and with chemicalization of the agriculture. One of its recommendations was to increase the production of nitrogen and phosphorus fertilizers in all member countries of the SEV, and also an increase of potassium fertilizers in the USSR and GDR. The USSR favored the natural gas and crude petroleum as the starting materials for these products by agreeing to supply them to member countries. The production of nitrogen fertilizers world-wide increased by 4.1 fold during 1960-1975, while among the SEV nations it was increased 6.9 fold. Analogous increases held in the

production of phosphorus and potassium fertilizers. In addition to the increase in the quantity of production, its quality was also improved, the assortment enlarged and the storage and transportation capabilities expanded. The working group standardized quality control measures. Ambitious plans were made for the 1981-1985 period: widening of the crude resources, protection of the environment, and further development of more effective technological processes. No figures or references.
[44-7813]

UDC 63.54

THE SCIENCE GOALS IN THE AREA OF AGRICULTURE CHEMICALIZATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 3-7

VOL'FKOVICH, S. I., NIUIF

[Abstract] This is an abbreviated version of a presentation at a general session of the USSR Academy of Sciences. Chemicalization of agriculture is continuously increasing, the Soviet Union being the leader in production of mineral fertilizers since 1973. The production of chemical plant protecting agents and biologically active compounds has not developed as rapidly. The need for an increased production of fertilizers is based on increases in the acreage being covered, losses due to the washouts, a low degree of effective utilization by the plants, and competition by weeds. The storage of fertilizers creates another set of problems. One of the important tasks is to improve the granularity of mineral fertilizers, making them capable of withstanding transportation and storage without losses. In addition to the fertilizers, attention should be directed towards the maintenance of the soil, especially in year-around, greenhouse-like farming. Chemicalization is not a temporary phenomenon, it is a long-lasting, gradually intensified factor in the progress of agriculture. No figures or references.
[44-7813]

THE FUTURE OF THE PRODUCTION AND UTILIZATION OF PESTICIDES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 13-19

MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] Pesticides include not only chemical agents used to control weeds and diseases of various plants, but also defoliants, growth regulators and dessicants. As the use of mineral fertilizers keeps increasing, more attention should be paid to measures protecting cultured plants. First, weeds must be destroyed, since they compete effectively for the nutrients in the soil, for water, etc. In this area, herbicides are very helpful. As the use of various chemicals increases, so does the contamination of the environment. It is stated, however, that pesticides are responsible for about 0.2 percent of the environmental pollution only, the principal contaminant being the combustion of fuel. Research in the area of pesticides concentrates on the activity of shorter duration, on agents less toxic to humans and those with faster degradation. A number of agents has been reviewed, stressing the need for the continuation of research to yield compounds without teratogenic, mutagenic or embryotoxic activity, compounds stable in storage and those with very special activity safe to humans. References 31: 11 Russian, 20 Western. [44-7813]

TOXICITY OF INSECTICIDES USED AGAINST STORED GRAIN PESTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 17 No 6, 1979 pp 19-21

LEVCHENKO, YE. A. and DIDENKO, L. N., All-Union Selection-Genetics Institute

[Abstract] Annual losses of grain are caused by a number of coleoptera pests. Contact toxicity of organophosphoric insecticides was determined under laboratory conditions. The most toxic agents were: tsianox, aktellik, valexon, baytex, diazinon and heterophos. Average toxicity was exhibited by: phozalon, etaphos, orten and dipterphos, while chlorophos was found to be non-toxic. The most resistant pests were sitophilus granarius, sitophilus orizae and tribolium castaneum herbst: orizaephilus surinamensis L. was less resistant; and tribolium madens charp was least resistant to the insecticides. Valexon and etaphos were effective as fumigating agents. Figure 1; references 6: 4 Russian, 1 Polish, 1 Western. [44-7813]

THE EFFECT OF PHOSPHAMIDE AND CARBOPHOS ON CITRUS WHITEFLY ESTERASE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, 1980 pp 39-41

LEKVEYSHVILI, N. I., Candidate of Agricultural Sciences, Georgian Scientific Research Institute of Plant Protection

[Abstract] Phosphamide, carbophos, etaphos and cidial were used in orchards in Georgia to test their effectiveness against the citrus whitefly. It was found that citrus whitefly is not tolerant to phosphamide or carbophos. However, cross-tolerance was found for cidial and etaphos, not previously used against this pest. The esterase mechanism of tolerance of the citrus whitefly is determined primarily by a decrease in sensitivity of cholin esterase to the oxygen analogs of phosphamide and carbophos formed in the organism of the treated insects. This indicates the beginning of formation of resistance in individual populations of the pest. Resistance is currently increasing slowly; however, if the insecticides continue to be used for long periods of time, the resistance may increase sharply. References 7: 2 Russian, 5 Western.

[136-6508]

EFFECT OF STEREO ISOMERS OF THIOPHOSPHORORGANIC COMPOUNDS CONTAINING AMINO ACID GROUPS ON MITE ESTERASE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, 1980 pp 37-39

SUNDUKOV, O. V., Candidate of Biological Sciences, GOLOVKINA, L. S., MASTRYUKOVA, T. A., Doctor of Chemical Sciences, SHIPOV, A. E., Candidate of Chemical Sciences, ZHDANOVA, G. V., KABACHNIK, M. I., Academician, All-Union Institute of Plant Protection VASKHNIL, Institute of Heteroorganic Compounds, USSR Academy of Sciences

[Abstract] The stereo isomers of organophosphorus compounds have different levels of physiologic activity with respect to arthropod esterases. The present study was performed with stereo isomers of thio- and dithiophosphates containing a fragment of the amino acid valine. The ordinary red spider mite and the Hawthorne mite were used, tested by immersion for 3 s in 20% alcohol solutions of the toxicants. The experiments were repeated three times with 50 to 60 mites in each version, dipped together with leaves

on which they were clinging. The effect of the compounds on the esterase was determined by studying mite homogenates. Differences in the toxicity of S-enantiomers for the two mites studied were observed, and may have been caused by differences in the rate of metabolic hydrolysis in the organism of the animals. Figures 2; references 11: 7 Russian, 4 Western.
[136-6508]

UDC 632.951:634.11

INFLUENCE OF INSECTICIDES ON DROPPING OF APPLES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, 1980 pp 34-36

LAGUNOV, A. G., Candidate of Biological Sciences, Volgograd Agricultural Institute

[Abstract] Various preparations are used to control the lesser apple worm, including sevin, which acts as a growth regulator and causes some of the fruit to fall. It can therefore only be used a month after blossoming. Experiments were performed in Volgograd Oblast with both summer and autumn apples to determine safe conditions for application of sevin. Sevin was found to be insignificantly more effective in causing dropping of very young fruit than other pesticides tested (rogor and fozalon). References: 11 Russian.
[136-6508]

UDC 665.644.4(083.9)/66.013.5/66-984

UNIT L-35-11/300ND FOR CATALYST REFORMING AT LOW PRESSURE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, 1980 pp 3-4

ASPEL', N. B., SALOV, N. P., and YZDENSKIY, V. B., Leningiproneftekhim

[Abstract] The title unit, which used a polymetallic catalyst, was built at the All-Union Scientific Research Institute for Petrochemistry. With regard to the mass balance, the new unit, as compared to a conventional unit, is distinguished by a decrease in dry gas and an increase in the hydrogen content of the product. The operating conditions for the two units are very similar in both the hydrogenation refining and the reforming blocks; however, for the latter, the pressure in the new unit is approximately half that of the conventional unit. The principal advantages are as follows: the feed-stock mixtures for the hydrogenation refining and reforming blocks are heated in individual tubular furnaces; the steam pipe and pipes for the stabilization of the catalyst are heated by a heat conductor via a heat exchanges re-boiler; the de-ethanization of the unstable catalysate is carried out in a two-column (adsorber-desorber) system. Tables 3.

[138-12027]

CATALYTIC REFORMING OF THE GASOLINE FRACTION (85-180°C) AT LOW PRESSURE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, 1980 pp 8-10

FEDOROV, A. P., MASLYANSKIY, G. N., SHKURATOVA, YE. A. and ZHARKOV, B. B., Krasnodarsky Branch of the VNIINeftekhim (TN: All-Union Scientific Studies Institute of Petrochemistry)

[Abstract] New bi- and poly-metallic catalysts for reforming have been prepared which are characterized by a high stability and which retain their selectivity at lower pressures. Results are presented for the catalytic reforming of a wide gasoline fraction (85-180°C) on one such catalyst (KR-106) at 15 atm (as compared to the usual 30 atm) and at temperatures of 470°, 490°, 500°, and 510°C. The lower pressure also permitted operating at a lower temperature. A high degree of specificity was retained for the formation of aromatic components through the dehydrocyclization of the paraffins. With increasing temperature, the following changes were noted: the overall gasoline yield decreased (from 93.1 to 81.1%), the C-5+ increased (from 1.27 to 2.42%), the hydrogen content of the cyclization gas decreased (from 90.6 to 78%), the methane content increased (from 3.5 to 6.5%), the paraffin and naphthene components decreased (from 46.6 to 20.5% and from 5.4 to 2.6% respectively), the aromatic fraction increased (from 47 to 75.9%) as well as the relative yield due to the cyclization of paraffins (44.5 to 59.2%) and the octane number increased (from 73.0 to 89.7). Tables 4; figures 2. [138-12027]

EXPERIMENTAL RUN OF THE 35-6 UNIT OF THE NOVOKUYBYSHEVSKY NPZ (TN: expansion uncertain: oil-producing zone?) UNDER A SEVERE REGIME

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, 1980 pp 18-19

KARPEYEV, V. M., ZABOTIN, L. I., LEVINTER, M. YE., SEMENOV, V. F., VASIL'YEVA, M. I. and TEREKHIN, YE. M., PO "Kuybyshevnefteorgsintez"

[Abstract] The title unit was operated under a more severe regime than had been reported previously in order to determine the yield and product composition under these conditions. A second reason was to obtain information on the individual steps in the reforming towards the end of the reaction cycle (after 400 days of operation). With the increase in severity, the average temperature of the process increased from 474° to 480°C; the pressure at the compressor intakes decreased from 15 to 12 atm; the H₂ content

of the cyclization gas decreased from 82.4 to 75%; the yield of stable catalyst decreased from 90 to 85.5%; n- and iso-paraffins decreased from 18 to 12.3% and from 28.8 to 25.4% respectively while the cyclopentanes and cyclohexanes decreased from 2.7 to 1.8% and from 0.5 to 0.4% respectively; and the aromatic and the xylol + ethylbenzene fractions increased from 50.0 to 60.1% and from 28.1 to 35.5% respectively. Tables 1.
[138-12027]

UDC 665.637.88.013/66.023.23/658.511.3

EVALUATION OF THE OPERATION OF A COLUMN-TYPE REACTOR OF THE NK NPZ [NOVOKUYBYSHEVSKY OIL REFINERY] BITUMEN UNIT

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 12, 1980 pp 11-13
manuscript received 20 Feb 79

FOMIN, N. I. and LAVRENT'YEV, V. V., PO "Kuybyshevnefteorgsintez"

[Abstract] In order to improve the characteristics of processed bitumen, the following sections of the bitumen unit were modified: two oxidizer columns were assembled, a compressor and pump apparatus were changed, and the condensation system for the oxidizing gases was expanded. A block diagram of the new system is shown. Operation of the oxidizing column is easy to regulate and is not as difficult to service as the cubic assembly. The introduction of the new column results in an increase in the amount of bitumen which can be processed and an improvement in its characteristics. Data on physical properties of samples oxidized in both the cubic and the columnar assemblies are given. An increase in the oxidation temperature in the column to 270°C permits a reduction in the oxygen content of the oxidizing gases thereby allowing a lower air flow. A table shows the correlations among productivity, oxidation temperature, air flow, oxygen content in the oxidizing gas, and softening temperature of the product. Figures 1; tables 2.
[140-12027]

EXPERIMENTAL-COMMERCIAL OXIDATION OF BOTTOMS STOCK IN THE PRESENCE OF IRON CHLORIDE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 12, 1980 pp 8-11 manuscript received 24 Apr 79

SHABALINA, L. N., GUN, R. B., SAMOKHVALOV, A. I., PANKOV, N. P. and FINASHIN, V. N., Moscow NPZ [Oil Refinery]

[Abstract] Studies carried out for the last ten years on the application of traces of FeCl_3 during the oxidation of bitumens in the commercial production of roofing material have shown the high durability of catalytically oxidized bitumen. Four regimes, two with 0.1% FeCl_3 and two without catalyst, were evaluated. The parameters which were varied include rate of introduction of asphalt (30-40 m^3/hr), temperatures at different points in the distillation column, and temperature in the assembly (220-240°C). Five samples of the oxidized bitumens and one of the original material were analyzed for physical properties and chemical composition. The properties of all the oxidized bitumens fell within virtually the same range but those of the original material were distinctly different. Nonetheless, the asphalt paving made of the catalytically oxidized bitumen, above a temperature of 0°C had a 16-28% greater resistance to compression and a 14-22% lower deformation than that made from bitumen to which FeCl_3 had not been added during the oxidation. The catalytically oxidized bitumen was also more stable at higher temperatures; however, at the lower temperatures it was somewhat more rigid than the non-catalytically oxidized bitumen. Figures 2; tables 2.
[140-12027]

STUDY OF THE OPTIMUM INTRODUCTION OF CORROSION-PREVENTION REAGENTS INTO SECTIONS OF THE LK-6U PETROLEUM PRIMARY DISTILLATION UNIT OF THE MOSCOW NPZ (TN: petroleum-producing zone?)

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 12, 1980 pp 5-8 manuscript received 16 Mar 79

GERINA, L. S., TOMIN, V. P., PUSHKAREVA, G. A. and FOKIN, V. A., Moscow NPZ [Oil Refinery]

[Abstract] One of the principal methods for preventing corrosion is the addition of salts or alkalis to oils, in order to convert the calcium and magnesium chlorides into the difficultly soluble hydroxides or carbonates, plus sodium chloride which does not hydrolyze during the initial distillation of the oil. The original crude had a $\text{CaCl}_2:\text{MgCl}_2:\text{NaCl}$ ratio equal to 36:16:51; for the desalted, dewatered crude, that same ratio is 77:23:0. A 4:1 salt:alkali solution having a total solids concentration of 22.3 g/ton was added to the desalted oil in doses of 10, 20, 30, and 40 g/ton. Plots of corrosion indicators such as H_2S , pH, Fe, and others as a function of the amount of salt-alkali solution added show that the optimum dose is 25-30 g/ton desalted crude. A 3:1 salt-alkali solution was also evaluated but the corrosion protection was inferior to that of the 4:1 solution. Figures 2; tables 1.

[140-12027]

EVALUATION OF PERFORMANCE ENHANCEMENT OF TOPPING COLUMNS IN UNITS FOR THE PRIMARY PROCESSING OF OIL FROM THE NK NPZ [Novokuybyshev Oil Refinery]

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 12, 1980 pp 3-4 manuscript received 16 Apr 79

UZUNKOYAN, P. N., KARPEYEV, V. M., SHEVELEV, YU. V. and VAKHMYANIN, V. I., PO "Kuybyshevnefteorgsintez"

[Abstract] The operating indicators for the units are to a greater or lesser extent a function of the efficiencies of the component parts. Laboratory studies were conducted to define these relationships using 11 units of different sizes and capacities operating at different temperatures and pressures. It was concluded that in all the units but one, the lower level of the initial heating of the oil and also the topping columns do not receive

sufficient heat. As a result, the entire topping column for all but one of the units operates with a minimum efficiency which is unrelated to the amount of heat or number of theoretical plates in the column. A 25-30% increase in the flow of oil to the mouth of the column is necessary to increase the temperature of the base of the topping column by 30-40°C. The presence of the circulating oil flow complicates the design for the unit; nonetheless, the system has the advantage of providing a separate coil in the heater. Otherwise, an artificially high pressure would be generated in the transfer piping for the heated coil. Circulation of larger amounts of oil requires an additional expenditure of energy. Tables 1.
[140-12027]

INFLUENCE OF HYDROCARBON PORTION OF SURFACTANTS ON THEIR ORIENTATION ON METALS

KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 43-45

DEMCHENKO, V. S., MARKOV, A. A. and BELYAKOVA, V. I., Leningrad Institute of Construction Engineering

[Abstract] A study is made of surfactant corrosion inhibitors. The strength of the bond between the additive molecule and metal depends to a great extent on the nature and total number of atoms in each molecule directly bonded to the surface of the metal. Earlier works have assumed that each molecule of the additive in the boundary layer of a film is bonded to the metal only through one active atom, such as sulfur, phosphorus or nitrogen, and that the hydrocarbon portion of the molecule is located in space perpendicular to the surface of the metal. This concept is based on old studies which showed the presence of a saturated monomolecular layer of vertically oriented molecules of fatty acids at the interface with water. However, a metal surface is quite different from a water surface, and surfactants can interact with metal surfaces through the carbon molecules, and also through the free electrons of various organic groups. In the development of corrosion-resistant additives, one must carefully consider the properties and position of the functional groups, as well as the properties and structure of the carbon portion of the molecule to assure firm bonding with the metal surface. References: 11 Russian.
[123-6508]

HIGH-INDEX MIXTURES OF ESTERS AND DEPARAFFINATED RAFFINATES

KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 42-43

VARFOLOMEYEV, D. F., MUSAYEV, Z. Z., KUKOVITSKIY, M. M. and BUKKULOV, A. Z.,
Ufa Refinery imeni The 22nd CPSU Congress

[Abstract] An earlier article studied the influence of the structure of the molecules of components mixed on the viscosity index of mixtures containing a mineral component and an ester. This article presents materials showing the nature of the change in viscosity index of these mixtures with a change in the content of the ester. In all cases, the actual index of viscosity of the mixtures of deparaffinated raffinates and esters was higher than the arithmetic mean value of the components. The maximum value of index of viscosity corresponds to a content of 60-70% ester. The increase in index of viscosity of mixtures of deparaffinated raffinates and esters is proportional to a ratio of coefficients of viscosity depression of $k_{50}:k_{100}$. Figures 2; references: 4 Russian.
[123-6508]

UDC 66.094.382.004.4

EFFECTIVENESS OF ANTIOXIDANT ADDITIVES IN UNDERGROUND STORAGE OF FUELS

KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 26-28

AZEV, V. S. and KUZNETSOVA, L. N.

[Abstract] The influence of sodium chloride on the effectiveness of antioxidant additives intended for stabilization of fuel stored underground was studied by oxidation of chemically unstable fractions of gasoline produced by cracking at 130-180 C. Oxidation was performed at 100 and 110 C for 6 hours without salt and with 8 g of NaCl per 100 ml fraction. The studies demonstrated the possibility of effective chemical stabilization of fuels containing unstable thermal cracking components for underground storage in salt caverns using PODPA (p-oxydiphenylamine), ionol and FCH-16 (composition not given). Preference should be given to PODPA. References: 6 Russian.
[123-6508]

PRODUCTION OF A HIGH-SULFUR ADDITIVE FOR LUBRICANTS

KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 15-16

UTKIN, V. A. and SEROV, V. A., All-Union Scientific Research Institute for Planning and Design of Petrochemical Processes

[Abstract] The reaction of n-butylchloride with elementary sulfur in the presence of ethylene diamine under moderate conditions (30-40 C) was selected for the synthesis of high-sulfur lubricant additives. The product of the reaction is a mixture of disulfides and trisulfides. Reaction conditions were sought to maximize the trisulfide content. Conditions were found under which the trisulfide content reaches 30%, the sulfur content exceeding 50%. The elemental sulfur also remains stable, greatly increasing the antiscratching properties of the additive. References 5: 2 Russian, 3 Western.

[123-6508]

CARBON ADSORPTION RECOVERY OF GASOLINE VAPOR

KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 13-15

KISAROV, V. M., BEGUN, L. B., KUDAKOVA, L. M. and SUBBOTIN, A. I., Dzerzhinsk Affiliate of the Scientific Research Institute for Purification of Gases

[Abstract] A study was made of the adsorption of vapors of type BR-1 gasoline on industrial activated carbon type AR-3 and SKT in the laboratory. The variation of saturated vapor pressure with temperature was measured in the 290°-370°K temperature interval. The dynamics of adsorption was studied on the basis of increase in the concentration of the components of gasoline beyond the layer of adsorbent with time. The carrier gas used was air. A table shows the time of protective action as a function of adsorbent layer thickness and the distribution of adsorbate over the length of the layer. The best results were achieved by using two layers, one of each of the two types of carbon tested. Characteristics of desorption and drying of the carbon after saturation are also studied. Figures 3; references: 5 Russian. [123-6508]

CHANGE IN THE QUALITY OF PARAFFIN WITH STAGED CARBAMIDE FEED

KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 2, 1980 pp 10-12

DORODNOVA, V. S., MARMYNENKO, A. G., MARTIROSOV, R. A. and PEREVERZEV, A. N., Groznyy Petroleum Scientific Research Institute

[Abstract] In order to achieve the maximum paraffin yield from carbamide dewaxing of petroleum, the raw material must be treated three times or more with the carbamide. However, published works to date have presented no information on the properties of the waxes extracted in each stage of carbamide treatment or the variation in these properties as a function of the quantity of carbamide input per unit time. A series of experiments involving extraction of paraffins with crystalline carbamide input in portions was performed to answer these questions. The results are presented in tabular form. The first portion of carbamide picks up the hydrocarbons of highest molecular weight, and each subsequent stage extracts lighter and lighter waxes. Figures 4; references: 5 Russian.
[123-6508]

UDC 665.6.66.013.5

STATUS OF PLANNING AND PROSPECTS FOR CONSTRUCTION OF THE NEW LK-9M COMBINED INSTALLATIONS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 3-5

VASIL'EV, A. V., Lengiproneftekhim

[Abstract] The LK-9M oil refinery installation is intended to work with a mixture of Western Siberian petroleum. The plant includes the following sections: primary distillation of petroleum with electric desalination; preliminary hydropurification of gasoline and secondary fractional distillation; catalytic reforming of gasoline; production of RT fuel component; hydropurification of diesel fuel; gas fractionation; isomerization of the pentane-hexane fraction. Each of these sections is briefly described. The LK-9M is intended to replace the LK-6u refinery equipment, which has served as the basis of its development.
[121-6508]

UDC 665.6
66.013
665.63.013.004.69

MODERNIZATION OF ONE SECTION AT OF THE LK-6u INSTALLATION IN ORDER TO
INCREASE ITS ECONOMIC INDICES

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 5-7

LOZIN, V. V. and MANOVYAN, A. K., Groznii

[Abstract] The plan for the LK-6u combined installation called for rigid coupling of all processes, without intermediate cooling of process streams. However, the installation was first started with reservoirs connected between the processes, requiring cooling and reheating of the streams. Also, intermediate heating and cooling installations were installed to remove water from the process stream to avoid poisoning of catalysts. Three systems have been suggested to eliminate the need to feed water vapor into the stripping section of the distillation column in order to avoid this problem. It was recommended that heat be fed into the bottom of the stripping columns by reboilers heated by the stream of distillate from the AT section. A system has also been developed for plants where large tonnage production of liquid paraffins is planned completely eliminating the use of steam in all fractional distillation processes. The system calls for separate fractional distillation of the vapor and liquid portions of the petroleum after initial evaporation, further distillation of the heavy reflux from the atmospheric pressure column in a vacuum fractionation column and complete elimination of water vapor from the atmospheric pressure distillation process. Finally, a new more efficient profile has been developed for the transfer line, reducing its length to less than half the previous length.

[121-6508]

UDC 665.633.8
66.023.23.001.24(083.13)
681.3

SOME RULES APPLYING TO THE PROCESS OF FRACTIONAL DISTILLATION OF STRAIGHT-RUN GASOLINE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 7-11

BOCHAUVER, K. Z., ROMANOVA, YE. G. and SHOKINA, L. I., All-Union Scientific and Production Institute for the Petroleum Industry

[Abstract] The authors performed a mathematical study of the process of fractionation of straight-run gasoline to produce nearer fractions. The data from this mathematical study and experimental data indicate a number of rules which can be used to simplify the design of secondary fractional distillation columns while assuring the necessary accuracy of calculation. The method is designed for solution of the problems of planning using medium and small computers, and also to be used in a system for automated planning and composition of more complex models. Figures 3.
[121-6508]

UDC 665.637.6
665.662.36.001.76

IMPROVEMENT OF THE PROCESS OF SELECTIVE PURIFICATION OF OILS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 18-20

SHEVTSOV, A. M., PETROV, V. N. and MISHCHENKO, A. F., Novokuybyshev Oil Refinery

[Abstract] A method of extraction has been developed which allows improvement in the accuracy of separation by a factor of 1.5 or more. The technological diagram is shown in an illustration. In contrast to the ordinary system, the lower portion of column K-1 receives a phenyl-free extract in place of the phenyl water, and separation of the secondary refined phenyl water solution is performed in a separate apparatus. Industrial testing of the method was performed primarily on deasphaltizate from petroleum arriving at the refinery between 1974 and 1978. Test data are presented in tables. Proper selection of the flow rate of phenyl-free extract into K-1 and phenyl water into E-8 assures optimal purification conditions.
[121-6508]

UDC 665.637.6:621.892.096/097
665.7.038.64.001.5
678.7

COMPARATIVE STUDY OF VISCOSITY ADDITIVES FOR MOTOR OILS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 20-22

VIPPER, A. B., NEPOGOD'EV, A. V., KOZHEKIN, A. V., KONAKOVA, S. A. and
YELAGIN, D. I.

[Abstract] A study was made of viscosity additives of various compositions for motor oils. It was found that additives based on styrene have the greatest thickening capacity, those based on polyisobutylene have the lowest. The viscosity of the oil was also tested as a function of shear speed gradient. None of the additives was found to be clearly superior to the others in all respects. However, polymer additives based on polymethacrylate shows superior characteristics under the conditions normally encountered in operating engines.
[121-6508]

UDC 661.715.25
661.716.1.4.5
665.632

EXPERIENCE IN SEPARATION OF COMMERCIAL PENTANES FROM THE BUTANE-PENTANE FRACTION OF HYDROPURIFIED ORENBURG CONDENSATE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 28-30

ASYLUGZHIN, A. SH., BELYAEVA, Z. G. and TOMEYEV, R. T., Salavat Petrochemical Combine

[Abstract] The Salavat Petrochemical Combine produces isopentane and n-pentane fractions from isopentane-pentane fractions containing not over 0.003% sulfur compounds by mass. Due to a shortage of low-sulfur pentane raw materials, the combine has begun to use Orenburg gas condensate, the butane-pentane fraction. The raw material is fed into a fractional distillation column at the 37th plate. The excess isobutane-butane fraction is removed for processing in the butane section of the installation. Diagrams are presented of the pentane section and the section for production of n-pentane and isopentane. A chromatograph is connected in the stream for quality control of the product produced.
[121-6508]

UDC 661.715.25
66.095.217
661.183.6

SPECIFICS OF THE TRANSFORMATION OF 1-PENTANE ON THE LANTHANUM FORM OF TYPE Y ZEOLITE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 30-32

DOROGOCHINSKIY, A. Z., KARAKASHEV, Z. G. and ZHAVORONKOV, M. N., Groznensk Petroleum Institute

[Abstract] A report is presented on a study of the transformation of 1-pentane on the lanthanum form of type Y zeolite. The catalyst which was studied was obtained by introduction of La^{3+} cations to the initial sodium form of zeolite by ion exchange. The studies were performed in the 300-450 C temperature interval at space velocities of 8-24 hr^{-1} . Experiments varied in length from 5 to 50 minutes. The following main conversions of pentane occur in this range of conditions: structural isomerization forming 2-pentene; skeletal isomerization forming isopentene; redistribution of hydrogen forming saturated hydrocarbons, cracking and disproportionation forming C_2 - C_6 hydrocarbons, formation of polymers, including some chemisorbed on the surface of the catalyst, and coke. As the space velocity increases, the overall activity of the catalyst, particularly in the reactions of skeletal isomerization, formation of chemisorbed polymers and coke and gas formation, decreases. Figures 3.

[121-6508]

UDC 665.65.001.6(571.53)
66.013
65.016.4
001.62

THE EXPERIMENTAL BASE OF THE RESEARCH CENTER OF "ANGARSKNEFTEORGSIINTEZ"
PRODUCTION UNION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 2, 1980 pp 41-42

KHUDYAKOV, A. YE., KLYUZHINA, YE. G., RUSANOV, N. P. and EPEL', S. A.,
Angarsnefteorgsintez Production Union

[Abstract] The union was created as a large research center and experimental laboratory. In 1967, a pilot plant was set up at the research center. It now includes a central laboratory; four technological shops (experimental installations, polyformaldehyde, hydrocracking and synthetic oil installations); three supplementary shops (mechanical repair shop, electrical parts shop and experimental shop); and a planning-design division. Each of the shops and divisions is described. No important developments are put into production until they have been tested in the pilot-scale plants of the union.

[121-6508]

UDC 665.664.592.2(575.41/574.12)

A COMPARATIVE STUDY OF HIGH-MOLECULAR NORMAL PARAFFINS OF PETROLEUM AND
OZOCERITE

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR--SERIYA FIZIKO-TEKHNI-
CHESKIKH KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 6, 1979 submitted
2 Apr 79 signed to press 18 Jan 80 pp 23-26

TALALYAYEV, YE. I., SERGIYENKO, S. R., AYDOGDYYEV, A. and CHELPANOVA, M. P.,
Turkmen SSR Academy of Sciences Institute of Chemistry

[Abstract] A comparison of the composition and concentration distribution of high molecular paraffin hydrocarbons from Cheleken ozocerite with residues of Kotur-Tepe, Oval-Towal and Burun petroleums showed that all samples studied contain homologs of normal paraffin hydrocarbons from C₃₉-C₅₅; the highest concentrations contained homologs with an even content of C-atoms--C₄₄, C₄₆. Kotur-Tepe residues closely resembled ozocerite in concentration

distribution of high molecular individual paraffin hydrocarbons. Both were superior to Burun petroleum in this respect while Oval-Toval petroleum was rated between these two. References: 2 Russian; figures 2. [133-2791]

UDC 665.664.592.2(575.41/574.12)

COMPOSITION AND PROPERTIES OF NORMAL PARAFFINS ISOLATED FROM PETROLEUMS OF THE WESTERN TURKMENISTAN DEPOSIT

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR--SERIYA FIZIKO-TEKHNI-CHESKIKH KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 6, 1979 submitted 2 Apr 79 signed to press 18 Jan 80 pp 27-32

TALALYAYEV, YE. I., SERGIYENKO, S. R., OVEZOV, A. A. and AYDOGDYYEV, A., Turkmen SSR Academy of Sciences Institute of Chemistry

[Abstract] A study of the composition and structure of hydrocarbons which form crystalline complexes with carbamide, isolated from the saturated part of 50° fractions boiling out within the limits of 200-500°C, of Eastern Kotur-Tepe, Oval-Toval and Burun deposits indicated that the Kotur-Tepe petroleum contained the highest (71-97%) level of unbranched forms of paraffins with Oval-Toval being second (66-88%) and Burun petroleum (41-57%) third. References: 2 Russian; figures 2. [133-2791]

UDC 665.592:547.21

STRUCTURE OF HYDROCARBONS OF THE MIDDLE FRACTION OF OVAL-TOVAL CRUDE

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR--SERIYA FIZIKO-TEKHNI-CHESKIKH KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 6, 1979 submitted 14 Jun 79 signed to press 18 Jan 80 pp 33-36

KARAYEV, YA. and ERNEPESOV, KH. N., Turkmen SSR Academy of Sciences Institute of Chemistry

[Abstract] A detailed chromatographic and spectrophotometric study of the composition and structure of the 250°-300° fraction of Oval-Toval crude showed that it contains transdecaline, 2-methyl-trans, trans, and 3-methyl-cis,- transdecalines in addition to previously known data about this fraction. References: 7 Russian; figure 1. [133-2791]

INDIVIDUAL HYDROCARBON COMPOSITION OF LOW-BOILING FRACTIONS OF DAULETABAD, EASTERN DAULETABAD AND DONMEZ CONDENSATES

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR--SERIYA FIZIKO-TEKHNI-CHESKIKH KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 6, 1979 submitted 2 Apr 79 signed to press 18 Jan 80 pp 37-41

KUL'DZHAYEV, B. A. and SERGIYENKO, S. R., Turkmen SSR Academy of Sciences Institute of Chemistry

[Abstract] A study of the individual composition of hydrocarbons of condensates of Dauletabad, Eastern Dauletabad and Donmez deposits of the light part of these condensates--boiling at up to 150° showed the basic part of the cyclic hydrocarbons is concentrated in the light fraction. In the lightest fractions (start to boil at 95°) cyclic hydrocarbons constituted 35-50% including benzene 21-33%, cyclohexane 5-7% and methyl cyclohexane 4-8.5%. As the boiling limits of fractions increased, the hydrocarbons level decreased and the paraffin content increased. References: 3 Russian. [133-2791]

SYNTHESIS OF ALIPHATIC HYDROCARBONS FROM CO AND H₂ OVER Rh-COMPLEX CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR, SERIYA KHIMICHESKAYA in Russian No 2, Feb 80 pp 335-338 manuscript received 6 Dec 78

LAPIDUS, A. L. and SAVEL'YEV, M. M., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Catalytic properties of the system $Rh_n L_m - AlBr_3 - Al$ (transition metal complex-Lewis acid-reducing agent) in the synthesis of hydrocarbons from CO and H₂ were investigated. Individual components and their binary combinations showed either none or very weak catalytic activity in this reaction. The activity and selectivity of this system depend on the type of Rhodium complex used and the ratio of the components and reaction temperature; the optimal system consists of the following components: Rh₄(CO)₁₂, [Rh(CO)₂Cl]₂, Na₂[RRh₁₂(CO)₃₀] and (Ph₃P)₃RhCl, with the Al:AlBr₃ ratio of 0.2-0.4 and the Rh:AlBr₃ ratio of 1:60 to 1:300. Conversion of

CO increased from 5 percent to 89 percent as the ratio of $\text{CO}:\text{H}_2$ in the reaction mixture decreased from 3 to 0.25. Removal of water from the reaction zone favored formation of longer chain hydrocarbons ($\text{C}_2 - \text{C}_4$). Figures 2; references 15: 1 Russian, 14 Western.
[127-7813]

UDC 678.06:63(575.2)

POLYMERIC MATERIALS IN THE AGRICULTURE OF THE KIRGIZ SSR

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 12-13

KHALMURZIN, K., chief of the section of agriculture of the Gosplan, KirgizSSR

[Abstract] Figures are cited to exemplify the accomplishments in Soviet agriculture requested by the plenums of the CC CPSU at the 24th and 25th Party Congresses. Kirgizia contributed its share in these accomplishments. In 1978 the republic produced over 1500 thousand tons of grain. Plastics have been exploited to assist agricultural production; polyethenylene plastic use in the Ninth Five-Year Plan amounted to 340 t, in 1977 to 616 t, in 1978 to 644 and in 1979 approximately 900 t was expected to be used. The plastics have been used as plastic shelter coverings for early vegetables, tobacco, seeds, hay, silage, fodders, storage and animal housing. Plastic sheets (from the All-Union Scientific Production Combine "Soyuzvodaftomatika") have been employed for covering mulched soil. Plastic piping has been investigated for use in soil reclamation and for irrigation (under the soil and spraying). Plastics are being studied as storage vessels for water, and as water-proof shields. Uses of various forms of plastics, acreage committed to such uses, type of crops, and profitability are tabulated. No references.

[87-8586]

USE OF POLYMERIC MATERIALS IN THE AGRICULTURE OF LATVIA

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 13-15

BELOKUROV, P. N., deputy chairman of Gosplan, Latvian SSR

[Abstract] The Latvian SSR is cited as an important supplier of meat and dairy products. Development of the republic's farm output involves production of high quality fodders, hay and silage. Polyethylene plastics (400-450 t per year) are being used in the Lat SSR to protect fodders from climatic damage. Polystyrols (pipets, gloves) are being used in artificial insemination and veterinary gynecology, and veterinary health care. The VNII vodpolimer [All-Union Scientific Research Institute of Polymers for Water Needs?] notes the present need to replace ceramic pipes with plastic tubing for drainage; the labor expended for ceramic drainage piping is difficult and replacement by plastics would have technological, economic and social advantages. Use of polymeric materials for reclamation and water-supply construction will have similar advantages. Plastics have been successfully used for irrigated (10% of existing systems) for 7-8 years. The "Sigulda" experimental farm, the "Bulduri" sovkhos-secondary training school, the "Brunava" sovkhos and the Orgsk experimental station are cited as having used plastic piping for irrigation. The Latvian SciRes Institute of Agriculture and Agricultural Economics has worked out use of transparent plastic protective coverings for vegetables; these protectants have been produced by the "Latgiprosel'stroy." Plastics are being used in hot houses for seeds, protective sheets and greenhouses. Plastics are being used in construction of farm buildings. A Livanskiy experimental home-construction combine has a projected capacity to construct 2000 single-room houses a year; use of plastics in such construction will be helpful. The Institute of Mechanics of Polymers of the Latvian SSR Academy of Sciences in association with Kalntsiemskiy Combine of Construction Materials and the Olainenskiy Plant for Processing Plastics are pursuing efforts to improve the quality and decrease the bulkiness of plastic parts, especially the contribution of fillers to reliability and effectiveness of plastic materials. Polymeric materials are being used in repair parts for tractors, autos, farm machines and animal housing. The LSSR State Committee on Material-Technical Provision to Agriculture has had--for over 10 years--eight sections involved with preparation of items from polymeric materials.

[87-8586]

USE OF POLYMERIC MATERIALS IN THE AGRICULTURE OF THE MOLDAVIAN SSR

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 15-16

USTIYAN, I. G., Moldavian SSR Gosplan chairman

[Abstract] Moldavia is cited as an important producer of grapes, fruits, vegetables and tobacco. This production is effectively improved by chemization of agriculture including introduction of plastics, synthetic resins and items made from them. Data are tabulated on the republic's irrigation system, its cost, types of piping (asbestos cement and polyethylene) and kinds of watering employed; the economics achieved are noted. The Section on Droplet Irrigation of the All-Union SciRes Institute of Mechanization and Technology of Irrigation, in association with the Institute of Biochemistry and Physiology and Plants, MolSSR Academy of Sciences, the NPO "Kodru" and "Vierul", the Moldavian SciRes Institute of Irrigation Agriculture and Vegetable Farming have worked out scientific recommendations for design, construction and use of a droplet irrigation system. Tubing for such a system uses polymeric materials. The Kishinev Combine of Chemical Preparations of the MolSSR Ministry of Local Industry has increased its output of polymers from 4 t in 1975 to 536 t in 1978 (1100 t are projected for 1979). Plastics are to be used as protectants in vegetable growing, and in year-round greenhouses (e.g., for melons and squash). Construction materials have recourse to plastic parts. Plastic containers are used for packaging, shipping and storage. Plastics are being adapted for soil mulching; B-118 plastic sheet, 0.2-0.3 mm thick, 90-100 cm wide is being used to cover the soil between plant rows to control weeds. Polymeric materials production in the republic increased, in 1975-1978, by a factor of 4.3. Acceleration of the transition of the economy to the new technology will be assisted by the plastics industry. References: 2 Russian.

[87-8586]

EFFECTIVENESS OF USE OF GAS-SELECTIVE POLYMERIC MEMBRANES IN AGRICULTURE

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 18-19

GUL', V. YE., BALAVINTSEVA, YE. K. and GENEL', S. V.

[Abstract] Certain polymers, e.g., polyorganosiloxanes, are known to have different rates of permeability for different vapors and gases (Volkov, 1979, and others). This makes it possible to sustain, in a closed space, with a membrane of such material, an atmosphere of a given composition. The present work is an attempt to find relationships between the properties which define the polymer structure, the time for establishment of a stationary regimen and the composition of the gas phase in a closed space. In this closed space there is, under real conditions, a source of renewal of the components of the gaseous medium. When fruit, vegetables and potatoes are placed in the closed space, biochemical respiration occurs, expressed by the formula $C_6H_{12}O_6 + CO_2 = 6CO_2 + 6H_2O + 674 \text{ kcal}$. The CO_2 and H_2O build up as long as equilibrium is not reached or if they are not removed by a gas-selective membrane. In the present work, the gas-selective device is a container, lined inside with a polyethylene insert, into which are placed products to be stored. The container has an orifice through which the starting, unmodified air enters. From the orifice, inside the container, goes a tube, with a sidearm, covered with the gas-selective membrane, to control the biochemical reaction in the products being stored. These products are the source of the gaseous substances. Gas exchange occurs in two stages, an immediate stage of change of gas composition and a stationary phase with no change of composition. Using mathematical description of the processes which go on it is shown that such a container can provide optimum composition of gases--by using an appropriate membrane substance and adjusting its physical properties to fit the products. The container can be used for storage of fresh agricultural products. References: 3 Russian.

[87-8586]

POLYMERIC MATERIALS POTENTIALLY USEFUL FOR CONSTRUCTION OF CULTIVATION EQUIPMENT

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 22-23

SYTNIK, V. I.

[Abstract] Using Soviet and foreign experience, the "Stroyplastik" experimental construction-design and technological bureau is currently developing i) glass fiber-reinforced polyethylene and polyvinylchloride plastics, ii) convexo-convex casings of transparent polyester plastic glass, and iii) sheets of hard, transparent polyvinylchloride. Use of (i) in protecting growing crops requires lasting strength and thermal properties. The second, (ii), group of plastics is finding use in greenhouses where they eliminate the disadvantages of metals. Properties of (ii) are discussed. The third, (iii), group, used abroad for some time, is finding some interest in the USSR. Its exploitation is hindered, at present, by the lack of formulas, in the USSR, for transparent hard polyvinylchloride materials which could meet environmental conditions and demands of year-round use. No references. [87-8586]

CHANGE IN PROPERTIES OF POLYMER PLASTICS IN THE PROCESS OF EXPLOITATION IN SPRING GREENHOUSES

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 26-27

BRYZGALOV, V. A. and OSIPOVA, G. S.

[Abstract] Polyethylene plastic is the basic polymer used to cover greenhouses; it has the disadvantage of low resistance to the atmosphere and is subject to breakdown after 4-5 months when used to cover metal frames. Attempts to improve its properties or to find a substitute (e.g., polyvinylchloride) have been underway. New forms are being tested at the Leningrad Order of Labor's Red Banner Agricultural Institute. These Soviet made forms are designated PES (polyethylene stabilized), PESG (polyethylene stabilized with hydrophilic antistatic), PVKh (polyvinylchloride) and (from Japan) plastics made of a copolymer of ethylene-vinylacetate (designated SEVA). They have been compared with polyethylene unstabilized (PE). Test results for changes in mechanical properties are tabulated. Studies were carried

out in 1975 (Jul/Sep), 1976 (Apr/Oct) and 1977 (Apr/Sep). Tests are not conclusive. It is pointed out that the polymers age more rapidly under greenhouse conditions, hence if new forms are being tested for use in agriculture, it is precisely under greenhouse conditions that testings should be made.

[87-8586]

UDC 628.743.21-416/01:63

ATMOSPHERE-RESISTANT PVC-PLASTICS DESIGNED FOR USE IN AGRICULTURE

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 30-31

ORDYNSKAYA, T. M., VILENSKIY, V. A. and SEREDA, O. V.

[Abstract] Output of plastics is to increase in the current Five-Year Plan to 434 thousand t. In agriculture, especially for covering greenhouses and seed hot houses, about 25-30% of the total amount of plastics is being used. Polyethylene (PE), most widely used, is subject to aging. Polyvinylchloride (PVC) plastics have some advantages over PE in resistance to the atmosphere, better physical chemical properties, ability to reflect heat rays, etc. The USSR has devised a standard, GOST 16272-70 for PVC plastic with "C"-trade-name; it lasts 2-3 years, depending on climate conditions. It is made, by extrusion, at the Dzerzhinsk PO "Kaproaktam" and, by the calendar-roll method, at the Nizhne Tagil plastics factory. Physical and chemical properties of "S" and of other PVC plastics are tabulated and discussed. It has been found that PVC plastic which contains a stabilizer (obtained from the West German firm Berlecher) and, also "PVC-10P" are more stable than "S". Use of the Berlecher stabilizer with "S" was tested in Feb 1977 at the greenhouse sovkhos imeni Vasil'yev in the Kiev Oblast with promising results.

Figure 1; references: 3 Russian.

[87-8586]

ECONOMIC EFFICIENCY OF USE OF POLYMERIC MATERIALS TO STORE AND TRANSPORT AGRICULTURAL PRODUCTS

Moscow PLASTICHESKIYE MASSY in Russian No 12, 1979 pp 32-35

SERGIYENKO, T. YE. and GENEL', S. V.

[Abstract] Polymeric materials are used in Soviet agriculture, in reclamation and in water management. Data of the USSR Ministry of Agriculture indicate that their use has had an economic effect of 4.3 thousand rubles/ton, i.e., 2.5-fold higher than the analogous figure for the national economy as a whole. Use of plastics for packaging, transport and storage is said to use up 40-45% of the total quantity of plastics used in agriculture, in the US; plastics are also of great importance in the USSR for the purposes cited and for preparing fodder. Figures are cited for the use of plastics in storage and transport of fresh vegetables, fruits and berries. Losses have been cut down. A way to calculate the economic effect of storing fruits and vegetables is developed and expressed by a mathematical formula. A common study of the conditions of industrial storage of fruits and vegetables in a modified atmosphere with use of plastic containers with membranes of selectively-permeable plastic material has been underway; associated in this work are i) the Problem Laboratory of Polymers of the Moscow Technological Institute of the Meat and Dairy Institute, ii) the Moscow Agricultural Academy imeni K. A. Timiryazev, iii) the NPO "Plastik", iv) the Moscow Co-operative Institute and v) the Kiev Trade-Economic Institute. The membrane used has, by selective gas-exchange, helped to protect the agricultural products. Also assisting in this effort has been the Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences. The efficiency of storage of fruits and vegetables in plastic containers with membranes which are selective gas exchangers is tabulated. The NPO "Plastik" and the Problem Laboratory of Polymers (of the Moscow Technological Institute cited above) has also developed reinforced plastic which is made into wind and snow-resistance packaging and can be used to protect hay and silage fodder. An economy of 525 million rubles is projected for 1980 if plastics are fully exploited. References: 20 Russian. [87-8586]

NONSTOICHIOMETRIC POLYELECTROLYTE COMPLEXES--NEW WATER-SOLUBLE MACROMOLECULAR COMPOUNDS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 12, 1979 pp 2719-2725 manuscript received 23 Oct 78

KHARENKO, O. A., KHARENKO, A. V., KALYUZHNYA, R. I., IZUMRUDOV, V. A., KASAIKIN, V. A., ZEIN, A. B. and KABANOV, V. A., Moscow State University imeni M. V. Lomonosov

[Abstract] Nonstoichiometric polyelectrolyte complexes (PC), representing the products of complete reactions between opposite-charged polyelectrolytes are, unlike stoichiometric PC, water-soluble, and thus are of interest since their existence makes possible investigation of PC by classical methods. In this connection, different methods for obtaining nonstoichiometric water-soluble PC for different electrolyte pairs are reviewed and it is shown that all these methods are based on the same principle of mixing together the necessary proportions of two completely ionized polyelectrolytes in the presence of low-molecular salt. The macromolecular characteristics of such PC are unaffected by the method of their synthesis, regardless of whether the LPE (lyophilizing polyelectrolyte--the polymeric ingredient accounting for the solubility of PC in water) is a polymeric anion or a polymeric cation. This warrants regarding such polycomplexes as equilibrium formations representing new macromolecular compounds. The solubility of the PC in which the LPE is the weak polyelectrolyte markedly depends on the state of the ionization of its groups, since a decrease in the degree of their dissociation is accompanied by loss of PC solubility. Figures 3; References 13: 11 Russian, 2 Western.

[77-1386]

SYNTHESIS OF POLYETHYLENETEREPTHATE WITH ADDITIVES OF TEREPHTHALIC ACID AND ITS ACIDS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, submitted 30 Jan 79 signed to press 28 Nov 79 pp 12-14

SHEVCHENKO, V. V., MIKHAYLOV, G. D. and POLYAKOV, L. V.

[Abstract] Regularities of the process of synthesis of polyethyleneterephthalate with additives of terephthalic acid and its ethers were considered as a combination of reactions of electrification, transesterification, acidolysis and ether exchange. The reaction capacity of the additive and its level in the mixture was found to produce the basic effect on the rate of reaction. The data presented justify the practical use of additives of reactive bifunctional compounds to intensify the polycondensation process in production of polyethyleneterephthalate. References 10; figures 2. [76-2791]

PRODUCTION OF BIS (BETA-OXYETHYL)TEREPHTHALATE FROM ETHYLENE OXIDE AND TEREPHTHALIC ACID

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, submitted 13 Dec 78 signed to press 28 Nov 79 pp 10-12

BAGROV, B. M., MIKHAYLOV, G. D. and MALYKH, V. A.

[Abstract] Competing kinetic models of reactions occurring at the stage of production of bis (beta-oxyethyl) terephthalate (BOEFT) were examined, discrimination models were presented and their kinetic parameters were evaluated. A kinetic model was obtained which permits prediction with accuracy sufficient for practical purposes (5 percent for ethylene oxide, terephthalic acid and bis (beta-oxyethyl terephthalate) and 15 percent for diethylene glycol derivatives) of the composition of the reaction mixture in the $373\text{ K} \leq T \leq 443\text{ K}$; $0.5 \cdot 10^{-2} \leq A_0 \leq 10^{-1}\text{ kmole} \cdot \text{m}^{-3}$ range of parameters. References 5. [76-2791]

CAUSES OF FORMATION OF UNSTRETCHED SECTIONS IN POLYAMIDE TEXTILE THREADS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, submitted 4 Dec 78 signed to press 28 Nov 79 pp 6-7

AVER'YANOV, A. A., ARKHIPOVA, L. M., MESHKOVA, B. YU. and FIL'BERT, D. V.

[Abstract] Causes and mechanisms of occurrence of so-called unstretched sections of polyamide textile threads which produce thickening of the elementary fiber of complex thread for a length of several mm up to several cm were discussed and some suggestions were offered for removal of such defects. Experimental data were presented which indicate that this defect arises from irregularities in the newly formed thread due to improper moisture content, flaws in the original polymer, irregularities in wetting the thread on the spinning frame or moisture exchange with the environment. Measures taken to eliminate such flaws at the Daugavpils Chemical Fiber Plant were discussed. References 2; figures 2.
[76-2791]

COMBINED POLYMERIZATION OF STYRENE AND NITROGEN CONTAINING DERIVATIVES OF ITACONIC ACID

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 5, submitted 14 Feb 79 signed to press 30 Oct 79 pp 37-41

ASKAROV, M. A., TUKHTAYEV, KH. R. and GAFUROV, B. L., Uzbek SSR Academy of Sciences Institute of Chemistry

[Abstract] Kinetics of combined polymerization of styrene and diamides of itaconic acid and determination of some kinetic parameters in their presence and absence were studied. It was shown that polymerization of styrene in the presence of nitrogen containing derivatives of itaconic acid involves participation of mobile hydrogen atoms in transfer of the chain and in the formation of low-activity radicals. An increase of level of itaconic diamides in the initial mixture reduced the yield of copolymers and eliminated the gel-effect. According to copolymerization constants, tetramethyldiamide was more active than tetraethyldiamide and dipiperide of itaconic acid. References 8; figures 6.
[84-2791]

SYNTHESIS OF POLYAMIDES FROM DIMETHYL ETHERS OF DICARBOXYLIC ACIDS

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR--SERIYA KHIMIYA in Russian No 4, 1979, submitted 23 Jan 79 pp 253-256

KONGAS, A., KIRET, O. and RAYALO, G., Estonian SSR Academy of Sciences Institute of Chemistry

[Abstract] A new catalyst for polycondensation of dimethyl esters of dicarboxylic acids with hexamethylenediamine was found and described. This is a compound of the type $(Ti(OR)_4)$, where R is ethyl, propyl, butyl, or isobutyl. A mechanism of catalysis and a mathematical model of the process was proposed and some kinetic constants were calculated. References 9. [80-2791]

BRANCHING DURING ETHYLENE POLYMERIZATION WITH ZIEGLER-NATTA CATALYSTS

Minsk IZVESTIYA AKADEMII NAUK BSSR--SERIYA KHIMICHESKIKH NAUK in Russian No 6, 1979 pp 5-9

YEROFEYEV, B. V., VALEND, A. YA., VESHTORT, V. Z., KOSTYAN, L. P. and KUSHEL', M. I., Institute of Physical Organic Chemistry, Academy of Sciences Belorussian SSR

[Abstract] Comparative studies were conducted on ethylene polymerization using only a $TiCl_4-AlEt_2Cl$ catalyst system, or one supplemented with organometallic compounds ($MgPh_2$; Mg, Mn, Fe, and Co stearates). IR spectra of the resultant polyethylenes showed that in the $TiCl_4-AlEt_2Cl-MgPh_2$ system branching was diminished and that a higher molecular weight product was obtained than with the $TiCl_4-AlEt_2Cl$ system. Introduction of the other metal cocatalysts yielded similar results. The effect of the metal ions in reducing branching was ascribed to modifications in the titanium active sites on the catalytic surface which inhibited transfer reactions and chain breakage, leading to the formation of linear, high molecular weight, polyethylene chains. Tables 2; figures 2; references 14: 1 Belorussian, 4 Russian, 9 Western. [94-12172]

STRUCTURE AND PROPERTIES OF MICROPOROUS CAPRON MEMBRANES

Minsk IZVESTIYA AKADEMII NAUK BSSR--SERIYA KHIMICHESKIKH NAUK in Russian
No 6, 1979 pp 17-21

ARTAMONOV, V. A., MOSTOVLYANSKIY, O. A. and SOLDATOV, V. S., Institute of
General and Inorganic Chemistry, Academy of Sciences Belorussian SSR

[Abstract] Structural (electron microscopy) and filtration characteristics of capron microfiltration membranes were investigated for the purpose of determining improvements that need to be made to insure better performance. The resultant data indicated that the membranes under study possessed an isotropic porous structure with a narrow pore size spread (63-90%) in terms of radii (0.1-1 μm). Thus, further improvements should be directed at increasing the number of open pores by incorporating methods yielding a fibrillar structure and the introduction of anisotropic pore structure to enhance permeability and complement the selectivity innate to isotropy. Figures 3; references 5 Russian.
[94-12172]

UDC 541(127+15+64):547(313.2+256.2)

COMPARISON OF THE KINETIC AND RADIOCHEMICAL METHODS FOR THE DETERMINATION OF THE ELEMENTARY CONSTANTS OF THE POLYMERIZATION OF ETHYLENE BY THE $\text{VCl}_4-(\text{iso-C}_4\text{H}_9)_2\text{AlCl}$ SYSTEM

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 2, 1980 pp 248-255
manuscript received 12 Jul 78

POMOGAYLO, A. D., BAYSHIGANOV, YE., MAMBETOV, U. A. and KHVOSTIK, G. M.,
Division of the Institute of Chemical Physics; Institute of the Chemistry
of Petroleum and Natural Salts, Kazakh SSR Academy of Sciences

[Abstract] Both the kinetic and the radioactive methods were used to determine the number of growth centers n_p and compute the constants of the elementary stages (growth, chain transfer onto monomer, aluminum-alkyl) and the mean lifetime $\bar{\tau}$ for the polymerization of ethylene by the system $\text{VCl}_4-(\text{iso-C}_4\text{H}_9)_2\text{AlCl}$. The kinetic method is based on the determination of $1/\bar{P}_v$ as a function of w_p/Q_τ , where w_p is the polymerization rate and Q_τ is the amount of polyethylene forming per time unit. The unsteady-state nature of the system $\text{VCl}_4-(\text{iso-C}_4\text{H}_9)_2\text{AlCl}$ was found to be associated with

the decrease in n_p with time (by a factor of 45 times within 30 min). The growth rate constant k_p determined by the kinetic method was found to be close to its counterpart determined by the radiochemical (^{14}CO) method ($7.5 \cdot 10^3/\text{a}$ and $18.5 \cdot 10^3$ 1/mol·sec, respectively), while the values of τ determined by these methods were 80 and 33/a sec, respectively. By contrast with titanium-containing catalytic systems, in vanadium-containing systems the introduction of ^{14}CO for tagging purposes is easier (owing to the lower acidity of the vanadium centers as well as to the specificity of the V-C bond). Figures 5; references 17: 8 Russian, 9 Western.
[122-1386]

UDC 541.64:539.3

EFFECT OF FEATURES OF THE TRANSITION OF SKN-40 RUBBER FROM HIGHLY ELASTIC STATE TO VITREOUS STATE ON THE TEMPERATURE-RATE ANALOGY OF BREAKING STRESS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 2, 1980 pp 297-302
manuscript received 12 Oct 78

SOLOV'YEV, YE. M., KITAYEV, YU. B., GUL', V. YE. and ZAKHAROV, N. D.,
Yaroslavl' Polytechnical Institute

[Abstract] The effect of straining rate, resulting in the conversion of polymers from highly elastic to vitreous state was investigated on SKN-40 rubber. Specimens of that rubber were dilatationally strained, on plotting the resulting stress-strain curves. It was found that the vitrification point of that rubber (normally 246 K) does not get displaced into the range of plus temperatures when the straining rate is changed from $17 \cdot 10^{-4}$ to 10 m/sec, if determined as a function of the maximum "true" strength of the rubber. If determined as a function of the elasticity modulus, however, the vitrification point of the rubber changes by $\sim 25-30^\circ$, presumably because in the former case back-transition from vitreous to forced-elastic state may occur owing to the appearance of local visco-elastic processes. General curves of the temperature-rate dependence of strength of the specimens for quasiisothermal (at low straining rates) and adiabatic (at high straining rates) modes of straining are derived. It is shown that in principle it is possible to predict the behavior of elastomers in the dynamic mode with the aid of data obtained at low straining rate upon introducing a temperature correction for the adiabatic mode associated with the high straining rate. Figures 5; references 19: 13 Russian, 6 Western.
[122-1386]

POLYHEXAFLUOROPROPYLENE

Moscow PLASTICHESKIYE MASSY in Russian No 1, 1980 pp 13-14 manuscript received 25 Jun 78

DUNAYEVSKAYA, TS. S., PANSIN, YU. A. and ANDREYEVA, A. I.

[Abstract] This article is a synopsis of literature data on the synthesis, structure, and properties of the title material. The first solid high-molecular-weight polyhexafluoropropylene (PHFP) was prepared by the polymerization of hexafluoropropylene (HFP) at high temperatures and pressures using such free-radical initiators as mercury bistrifluoromethylmercaptides ($\text{Hg}(\text{SCF}_3)_2$) or tin tetrafluoroacetate. Subsequent refinements and other methods are considered. The various methods of preparation gave rise to materials with slightly different properties. Thus the early data on the structure of PHFP were equivocal. The presence of an intense crystallinity reflex in the X-ray diffraction spectrum was considered as evidence for a high degree of crystallinity of the structure. Calculations of the conformational energy as a function of the internal rotation of the C-C bonds show that the most stable configuration of the isotactic PHFP is a spiral with a C-C-C angle of $113 \pm 2^\circ$. Some of the physical-mechanical properties of the PHFP are as follows: density, 2.08; softening temperature, 498° - 523° ; and dielectric permeability, 2.1. Others are mentioned. References 13: 10 Western, 3 Russian. [131-12027]

UDC 678.632'32'21.048.019-9

METHODS FOR INCREASING THE THERMAL STABILITY OF PHENOLFORMALDEHYDE POLYMERS AND MATERIALS BASED ON THEM

Moscow PLASTICHESKIYE MASSY in Russian No 1, 1980 pp 28-29

[Abstract] The thermal stability of phenolformaldehyde polymers (PFP) can be changed through the addition of stabilizers and the modification of its structure. The most effective additives known at the present time are powdered metals, their oxides and salts. The introduction of 20% W, Nb, Ti and Cr results in a 73% increase in the coking residual at 1373°K . Al powder (optimum about 0.05%) also stabilizes PFP. The mechanism responsible appears to be associated with the formation of intermediate ionic-covalent bonds between the powder and the polymer, which in turn alters the

intermolecular structure. The addition of transition metal oxides (Fe_2O_3 , MnO_2 , or Cr_2O_3) decreases the thickness of the carbon residue layer during coking. Some Ca and Mg compounds, as well as the borates, carbonates, chromates, and fluorosilicates of zinc and amorphous boron and silica also act as stabilizers. Organic compounds, such as dimethyl-di-p-phenylamino-phenoxy-silane; 2-(phenylazo)-1,3-phenylenediamine; 2,4,6-tri-(phenylazo)-1,3-phenylenediamine; aminoazobenzol; aromatic polycarbonates and various copolymers of naphthalene or anthracene with benzol, can stabilize the PFP structure. References 55: 11 Western, 44 Russian.
[131-12027]

RUBBER AND ELASTOMERS

ACHIEVEMENTS OF OMSK SYNTHETIC RUBBER PLANT DISCUSSED

Moscow IZVESTIYA in Russian 12 Jan 80 p 1

[Article by E. Mal'bakhov, Omsk: "Siberian Rubber"]

[Text] Constantly increasing the output of synthetic rubber and of materials for the production of plastics, Omsk petrochemists successfully fulfill the outlined goals.

Butane gas is the main raw material of the synthetic rubber plant. Only sensitive instruments "observe" the industrial processes hidden in hermetic columns. Two-pood briquets of rubber, without which no sector of the industrial rubber industry, primarily the tire industry, can do, can be finally seen only at the finished output warehouse. The most reliable consumer is next to it. This is the Omskshina Association.

The personnel of the group of shops of the Atsetal'degid Production Facility, which produces raw materials for the output of plastics, has success in the socialist competition. It fulfilled the program for 4 years of the five-year plan 2 months ahead of schedule. More than 5 million kwh of electric power (throughout the plant 11 millions) and 1,240 tons of ethylene were saved. The shifts of Valentina Shabalina, deputy of the Omsk City Soviet, and of Anatoliy Isayenko work in a shock way.

People also work at the same pace in Orgsintez shops. All alpha-methylstyrene is now produced with the State Badge of Quality, the production volume increasing by almost one-third in 4 years. The names of operators N. Kukharensko and V. Nechto, of fitter N. Antuf'yev and of many others are pronounced with respect.

"The assignment for labor productivity growth at the enterprise was overfulfilled by 5.7 percent," M. Raykhel'gauz, chief of the economic laboratory, says. "This is the result of introduction of new equipment and of rationalization, which produced an economic effect of 1.1 million rubles."

The profitability of the enterprise increased considerably. From 60 to 100 percent of the basic grades of rubber and latex have a higher category of quality. The plant is growing and builders are erecting new wings. At the same time, certain existing production facilities are being reconstructed.

[89-11,439]

11,439

CSO: 1841

PREPARATION OF A PLASTICIZER FOR TIRE RUBBER BY VACUUM CONCENTRATION OF EXTRACTS OF WESTERN SIBERIAN OILS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, 1980 pp 39-41

ZAVIDOV, V. I., POCHUYEV, P. N. and SHUBINA, N. S., Lower Volga Branch of GrozNII

[Abstract] Studies of low viscosity residual extracts for the title application indicate that such material significantly improves the characteristics of tire rubber, for example, by increasing its heterogeneity. An increase in the viscosity, density, and aniline point of the extract was observed with the increasing depth to which it was concentrated. This can be explained in that during the concentration, part of the paraffinic and naphthenic hydrocarbons is lost through distillation leading to a concentration of the aromatic components in the residual. The yields from two different feed stocks from residual distillate extractors were 57-65% and 68-72%, the higher yield being from the heavier feed stock. The obtained material met all technical standards governing plasticizers for tire rubber. Figures 2; tables 1.

[138-12027]

STRUCTURALIZATION OF SKF-26 FLUORINE RUBBER BY MEANS OF PHOSPHORUS-CONTAINING HYDROQUINONE DERIVATIVES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 12, 1979 pp 2708-2712 manuscript received 18 Oct 78

KARASEV, L. P., BUKALOV, V. P., VAL'DMAN, A. I., NIFANT'YEV, E. YE. and TUSEYEV, A. P., All-Union Scientific Research and Design-Technological Institute of the Rubber Industry

[Abstract] It is shown that SKF-26 fluorine rubber gets structuralized on reacting with biphosphorylated derivatives of hydroquinone and forms vulcanizates with a large number of valuable physicochemical properties. The structuralization occurs as a result of the alkylation of phosphites by the fluorine rubber, with formation of a phosphorus-carbon bond. The high-temperature continuous chemical stress relaxation method was used to investigate the process of the thermooxidative destruction of the resulting mesh

structures as a function of 50% dilational straining at 210-270°C. The chemical resistance of the cross-links was investigated as a function of the effect of concentrated nitric acid, and was found to differ depending on the phosphite used. Figures 2; references: 12 Russian. [77-1386]

UDC 678.664:54-14.004.12

PRODUCTION AND CERTAIN PROPERTIES OF ELASTIC POLYURETHANE OXIAMINES

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 7-10 manuscript received 9 Apr 79

MOROZOV, YU. L., AL'TER, YU. M., PRIBYLOVA, L. M., Scientific Research Institute of Rubber and Latex Products

[Abstract] A study was made of the peculiarities of the production and properties of polyurethane oxiamines based on oligoester (diene) urethane diamines and epoxy compounds of various types. The polyurethane oxiamines were synthesized both in mass by mixing of preheated coreagents with subsequent molding and thermostating, and in solution by pouring of a mixture of 30% solutions of the coreagents in chlorophorm into cuvettes and thermostating after complete removal of the solid. The curing temperature was 100-120 C. Completion of curing was judged by disappearance or stabilization of the intensity of the absorption band at 917 cm^{-1} . The physical and mechanical properties of specimens in the form of 0.2-0.4 mm films were determined by standard methods. The results of the studies showed that by varying the nature and relationship of oligomer diamines and flexible-chain and rigid-chain epoxy resins, one can obtain polymers with 3-dimensional structure and a broad range of physical and mechanical properties--from rigid plastics to highly elastic rubbery materials. Figures 3; references: 13 Russian. [83-6508]

UDC 678.762.3.063.01:539.3:
66.092.46.8:678.046

INFLUENCE OF SURFACE-ACTIVE AGENTS ON VISCOELASTIC PROPERTIES OF SKI-3
RUBBERS

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 16-19 manuscript received
9 Aug 78

SAGAYDAK, S. YA., GORELIK, B. M., DONTSOV, A. A., GARTSMAN, V. I., Scientific
Research Institute of the Rubber Industry

[Abstract] A study was made of the possibility of varying the components of the complex dynamic modulus of rubbers by adding various quantities of surfactants. The influence of the type and concentration of surfactant on the modulus of elasticity in harmonic shear and the mechanical loss angle tangent was studied in SKI-3 rubbers with various contents of active fillers. Surfactants used were of two types: nonionogenic and anionactive. Technical carbon was used as the inert filler. The vulcanizing group consisted of sulphur, sulfenamide C, zinc oxide and stearic acid. It was found that varying the quantity of surfactant and filler, as well as the degree of activity on the technical carbon, can significantly influence G' and $\tan \delta$. Thus, the use of surfactant additives can significantly vary the dynamic parameters of rubbers, and is promising from the standpoint of possible regulation of viscoelastic properties without deterioration of physical-mechanical parameters. Figures 3; references: 9 Russian.
[83-6508]

UDC 678.048:678.762.3

NEW HIGH-MOLECULAR-WEIGHT ANTIOXIDANTS FOR SKD RAW RUBBER

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 22-23 manuscript received
4 Dec 78

DOMNINA, N. S. and KIRPICHEV, V. P., Leningrad State University imeni A. A. Zhdanov

[Abstract] Results are presented from a study of the possibility of using products of the modification of the epoxy oligomer γ -4-oxy-3-5-di-tert butylphenylpropionic acid and γ -4-oxy-3-5-di-tert butylphenylpropylamine, as well as an oligomer with terminal isocyanate groups, γ -4-oxy-3-5-di-tert butylphenylpropyl alcohol, as high-molecular-weight raw-rubber antioxidants.

SKD raw rubber (M=250,000) was purified of low-molecular antioxidants by double reprecipitation in ethyl alcohol from a benzene solution. Polymer antioxidants are seen to protect the raw rubber more effectively from oxidation than low-molecular derivatives of 2, 6-di-tert butyl-4-alkylphenol, and are comparable in stabilizing effect to ionol. The high molecular compounds are thus effective raw rubber stabilizers, the use of which is particularly desirable when polymers must operate under high temperature conditions or in contact with solvents. Figures 2; references: 6 Russian. [83-6508]

UDC 678.031.5.063-416.019.32

SPECIFICS OF ATMOSPHERIC AGING ON FILMS OF NATURAL LATEXES

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 25-27 manuscript received 11 May 79

KRAYUSHKINA, YE. I., TAROSOVA, Z. N., CHERNAYA, V. V. and SHTEYNBERG, S. A., Scientific Research Institute of Rubber and Latex Products

[Abstract] Structural factors play a significant role in processes of aging and stabilization of elastomers. A study was made of the specifics of atmospheric aging of unfilled films 0.7-0.9 mm thick of natural revultex and qualitex rubbers. These latexes characteristically have globular structure but different distribution of vulcanization bonds due to the peculiarities of their manufacture. The films were subjected to atmospheric aging in Tashkent and accelerated aging under artificial light. The difference in kinetics of aging of films produced from latexes of the same polymer and with the same parameters of the vulcanization grid apparently result from the peculiarities of their structure and differences in distribution of vulcanization bonds. The results of the study show that the topology of the vulcanization grid has a significant influence on the stability of latex films against aging and stabilization. Figures 5; references 10: 8 Russian, 2 Western. [83-6508]

A NEW VULCANIZING AGENT FOR CHLOROPRENE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 23-25

PASTOR, T. I., DEVIKINA, L. I. and KRASOVSKIY, V. N., Leningrad branch, Scientific Research Institute of Rubber Industry, Leningrad Technological Institute imeni Lensovet

[Abstract] A study was made of the possibility of using milled metallurgical and shale slags, the mineral portions of which contain various metal oxides, as vulcanizing agents for the production of polychloroprenes. The compositions of the slags are presented. The slag particle diameters did not exceed 40 μ m. They were found to be effective vulcanizing agents, significantly increasing the duration of the induction period of vulcanization of the rubber mixture, increasing the resistance to thermal aging and retaining good mechanical properties of finished products.
[83-6508]

INFLUENCE OF OLIGODIENE URETHANE ACRYLATE ON PROPERTIES OF VULCANIZATES OF ETHYLENE-PROPYLENE COPOLYMERS

Moscow KAUCHUK I REZINA in Russian No 11, 1979 pp 33-34 manuscript received 23 May 79

LOTAKOV, V. S., YEVCHIK, V. S., MARKOVA, L. A. and NOSACH, G. D., Dnepropetrovsky Branch, Scientific Research Institute of the Rubber Industry

[Abstract] A study was made of the influence of oligodiene urethane acrylate type PDI-4AK on the bonding strength of rubbers to metal through a layer of leuconate adhesive. The molecular mass of the oligomer was ~5000. The metal surface was preliminarily degreased, treated with highly dispersed corundum sand in a sand blasting apparatus and two layers of luconate glue were applied. The rubber mixture was placed on the prepared metal surface and vulcanized in a hydraulic press at 160 C for 40 minutes. The presence of PDI-4AK results in the formation of firm chemical bonds at the interface between the adhesive and the rubber, greatly increasing the adhesive strength of the system. References: 7 Russian.
[83-6508]

CERTAIN PROPERTIES OF LOW-MOLECULAR POLYPENTENAMER

Moscow KAUCHUK I REZINA in Russian No 12, 1979 pp 10-13 manuscript received 6 Jun 79

YEFIMOV, V. A., SUMERKIN, A. N., TUROV, B. S. and SHILOV, A. D., Yaroslavl' Polytechnic Institute

[Abstract] The oligomers of cyclopentene synthesized by cometathesis of cyclopentene and hexene-1 in the presence of the complex catalyst $WCl_4 \cdot [OCH(CH_2Cl)_2]_2$ -alkylaluminumhalogenide were investigated. It was found that these oligomers display a broad molecular-mass distribution owing to the large number of the reactions occurring in the system. As their concentration of linear olefin increases, the characteristic viscosity and the mean molecular mass of the oligomers decrease. The polydispersity factor of the oligomers varies from 2 to 20 depending on the conditions of their synthesis. It is established that the oligomers exist in two crystalline states that differ in their melting point. The melting points and integral heats of fusion of the oligomers are determined. It is also concluded that, all other conditions being equal, cyclopentene-based oligomers display a higher viscosity range than does low-molecular cis-butadiene. Thus, the low-molecular polypentenamer represents a new type of oligomeric products and may be of interest for use in the paints and lacquers and tire industries. Figures 4; references 14: 6 Russian, 8 Western. [93-1386]

ASPECTS OF THE RHEOLOGICAL BEHAVIOR OF DST-30 BUTADIENE-STYRENE THERMO-ELASTOPLASTIC

Moscow KAUCHUK I REZINA in Russian No 12, 1979 pp 16-18 manuscript received 10 Jul 78

AL'TZITSER, V. S., KANDYRIN, L. B., ANFIMOV, B. N. and KULEZNEV, V. N., Scientific Research Institute of Rubber and Latex Products

[Abstract] Knowledge of the rheological behavior of thermoelastoplastics (TEP) within the range of temperatures corresponding to the conditions of their extrusion and injection molding is desirable. In this connection, the rheological behavior of DST-30 TEP was investigated. It was found that at shear stresses of $>10^{6.3}$ dyn/cm² the flow of DST-30 TEP becomes stalled.

The Newtonian flow of the investigated TEP at shear stresses of 10^4 - $10^{5.7}$ dyn/cm² in the presence of 130-170°C points to the absence of an effect of the two-phase structure of the material on the nature of its flow, and is probably due to the polybutadiene part of the molecule. The activation energy of the viscous flow of TEP is 20-24 kcal/mole, which is higher than for elastomers, and hence TEP should be processed at higher temperatures of the order of 180-200°C. It can be concluded that the processing of TEP can be improved by developing special plasticizing systems that effectively reduce the viscosity of TEP without markedly lowering its physico-mechanical indicators. Figures 3; references 8: 7 Russian, 1 Western. [93-1386]

UDC 678.84.063.019.391

ASPECTS OF THE AGING OF SILOXANE RUBBER IN AIR

Moscow KAUCHUK I REZINA in Russian No 12, 1979 pp 26-31 manuscript received 7 Sep 78

CHUBAROVA, G. V., GOLDOVSKIY, YE. A. and DONTSOV, A. A., Scientific Research Institute of the Rubber Industry

[Abstract] It is shown that during the initial stage of the aging of two varieties of siloxane rubber, SKTV and SKTV-1, in air at 300-350°C (and for SKTV at 250°C as well), a major factor is the process resulting in the formation of the sol fraction--hydroxyl-containing dimethylsiloxane oligomers. The decrease in the strength of the rubber in that initial stage of aging is the greater the lower the extent of cross-linking of the original rubber and the higher the aging temperature are. The extent of the destructive changes in the aged rubber follows the same pattern. These changes in the physicochemical characteristics of rubber are attributable to the effect of oxygen, but the degree of oxidation of the polymer during that stage is low. Figures 5; references 11: 4 Russian, 7 Western. [93-1836]

EFFECT OF DEFORMATION ON THE FROST RESISTANCE OF FILLED AND UNFILLED RUBBER

Moscow KAUCHUK I REZINA in Russian No 12, 1979 pp 35-37 manuscript received 1 Jun 79

BARTENEV, G. M., KUCHERSKIY, A. M., FEDYUKINA, L. P. and RADAYEVA, G. I., Scientific Research Institute of the Rubber Industry

[Abstract] The relationship between the frost resistance and deformation of rubber was investigated for specimens of filled and unfilled rubber subjected to uniform dilatational straining at pressures reaching -40°C . It was found that the effect of tensile stress on the frost resistance coefficient K increases the closer it is to the vitrification point of the filled rubber. The greater the deformation, the higher the K of the rubber becomes, whereas for unfilled rubber and for the rubber varieties containing a relatively small amount of low-activity filler, the pattern is different and K then decreases owing to the attendant increase in the orientation of the rubber chains, or it may reach a minimum and then increase. These findings should be considered when determining the frost resistance and performance of rubber products. Figures 3; references 10: 7 Russian, 3 Western.
[93-1386]

EFFECT OF PRINCIPAL PERFORMANCE CHARACTERISTICS ON THE WEAR OF AUTOMOTIVE TIRE PROTECTORS

Moscow KAUCHUK I REZINA in Russian No 12, 1979 pp 39-44 manuscript received 15 Jun 79

NOVOPOL'SKIY, V. I. and TARNOVSKIY, V. N., Scientific Research Institute of Tire Industry; Volgograd Polytechnic Institute

[Abstract] A satisfactory wear resistance of the protector is a major factor in prolonging tire life. In this connection, the effect of normal load, tire pressure, torque, braking, rolling rate, and alignment on the wear of car and truck tire protectors was investigated on a test stand. It is shown that the wear rate of car and tire truck protectors as a function of normal load and tire pressure can be described by linear equations, while the wear rate as a function of rolling rate and wheel alignment is described by exponential equations. Normal load, torque, rolling rate, and

wheel alignment are the principal factors affecting the wear rate of the car tire protectors, while the wear rate of the truck tire protectors is affected by tire pressure to a somewhat greater extent. For example, when tire pressure is increased by 20% above the recommended value, the wear rate of car tire protectors increases by 15% but that of truck tire protectors, by 20%, apparently owing to the higher existing truck tire pressure standards. Figures 5; references 12: 10 Russian, 2 Western. [93-1386]

UDC [678.07:677.4].061.43.01"313"

PROMISING ELASTOMERS AND CORD FOR TIRES

Moscow LAUCHUK I REZINA in Russian No 12, 1979 pp 45-50

YASHUNSKAYA, F. I., Scientific Research Institute of Tire Industry

[Abstract] The prospects for the application of various types of elastomers and cord in the tire industry are surveyed for the next 20 years. The level of utilization of synthetic rubber (SR) in the Soviet tire industry is extremely high--91.5% in 1978. The most widely used type of SR in the Soviet tire industry is SKI-3 synthetic cis-1,4 polyisoprene. The properties of SKI-3 will eventually be further improved through advances in catalytic polymerization systems and addition of polar groups. Then there is the SKD cis-1,4 polybutadiene rubber, a quality tire elastomer with stereoregular structure, whose consumption is steadily increasing. The same can be said of butadiene-styrene and butadiene-methylstyrene rubber. In general, the variety of available tire rubber types will be broadened after 1980. As for cord, it will continue to be an important tire-industry material. During the 1980s and particularly during the 1990s synthetic-fiber cord based on aromatic polyamides will be extensively used along with metal cord. The polyester and fiberglass varieties of tire cord used in the United States represent unpromising types of cord and have not been introduced in the Soviet Union. If, however, the quality of the fiberglass reinforcement is improved, it could be introduced in Soviet passenger cars and pickups. References 13: 1 Russian, 12 Western. [93-1386]

THE NATURE OF RAPID AND SLOW HYPERELASTIC DEFORMATION OF ELASTOMERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 249 No 6, 1979 pp 1377-1380 manuscript received 7 Jun 1979

BARTENEV, G. M., The Institute of Physical Chemistry, Academy of Sciences of the USSR, Moscow

[Abstract] Data from relaxational spectrometry and structural features of elastomers during slow and rapid phases of hyperelastic deformation show sharply different stages. The rapid stage was shown to be connected to segmental movement of macromolecules, while slow deformation is related to local van der Waals bonds between macromolecules, and their gradual decomposition. The structure of elastomers appeared to be composed of free segments and chains, on the one hand, and orderly sections and bound segments, on the other. Figures 3; references 13: 10 Russian, 3 Western. [119-12131]

SPECIFICS OF THE PROCESS OF STRENGTHENING OF ORGANOSILICON RUBBER TYPE SKT BY AEROSILS WITH VARYING SPECIFIC SURFACE

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 6, Nov/Dec 79 pp 15-17 manuscript received 17 May 79

SAZYKINA, O. N. and ZAKORDONETS, S. M., Kiev Branch of Scientific Research Institute for Rubber and Latex Products

[Abstract] The authors performed electron microscopic, colorometric and physical-mechanical studies of polydimethylsiloxane rubber reinforced with aerosils with varying specific surface. The specimens were prepared on a laboratory roll mill by mixing the raw rubber with the aerosil in a ratio of 100:35 parts by weight with subsequent pressing and heat treatment of the mixture for 30 minutes at 200 C. Aerosils with specific surfaces of 175, 300 and 380 m²/g were used. Swelling decreased with increasing specific surface, which was explained by increasing rigidity of the macromolecules in the boundary layers under the influence of the solid surface, preventing swelling by changing the conformation of the polymer macromolecules. The specific surface also greatly influenced the thermal properties of the silicone rubbers. A significant decrease in the thermal effect of crystallization and an increase in the melting point occurred with increasing specific surface. Figures 2; references 9: 8 Russian, 1 Western. [116-6508]

SYNTHESIS OF POLYISOPRENE STABILIZERS IN A SERIES OF ACID PHOSPHITES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 52 No 7, Jul 79 pp
1600-1604

TUSEYEV, A. P., KARPOVA, L. V., VAL'DMAN, D. I., et al

[Abstract] Mono- and di-alkyl esters of phosphorous acid are effective polymer modifiers. Esterification of phosphorous acid with p-hydroxydiphenylamine, p-hydroxyphenyl- β -naphthylamine, bis-2-hydroxy-5-methyl-tert-butylphenylmethane and 2,6-di-tert-butyl-4-methylphenol yielded acid phosphites proved to be very effective stabilizers of cis-1,4-polyisoprene. During the aging process, these phosphites modify the polymer by adding to its double bonds. Polymer modifications with these phosphites during the sulfur vulcanization process yields a rubber with increased heat stability, for performance in organic solvent media. Figures 2; references 15: 11 Russian, 4 Western.
[38-7813]

INVESTIGATION OF THE SELECTIVE FLOCCULATION OF COAL TAILINGS USING LATEX

Moscow KOKS I KHIMIYA in Russian No 9, 1979 pp 9-12

LYADOV, V. V., GRYANKO, V. I., NIKITIN, I. N., et al, Makeyev Coke-Chemical Plant, UKhIN, Voronezh Plant

[Abstract] The selective flocculation method of coal tailings (coagulation) is based on the action of various reagents capable of stabilizing argillaceous particles and precipitating coal particles. Until now, this operation was practiced only on a laboratory scale and in pilot plants. Now, it was shown that latexes made from divinyl styrene, using the emulsifiers mekal and potassium parafinate, showed satisfactory selective flocculating abilities, enriching coal tailings very effectively. The use of relatively small quantities of the latex (150-300 g/t) led to an effective separation of the pulp into argillaceous and coal components. Higher levels of the latex increased the moisture content of the concentrate. The appearance of foaming led to a less effective separation, since foam captured considerable amounts of coal flocules. Figure 1; references 6: 4 Russian, 1 Polish, 1 Western.
[42-7813]

PROPERTIES OF NEW GASOLINE, OIL, HEAT AND FROST RESISTANT RUBBERS AND VULCANIZATES BASED ON THEM

Moscow KAUCHUK I REZINA in Russian No 2, 1980 signed to press 31 Jan 80
submitted 11 Jun 79 pp 9-10

YUZHLEVSKIY, YU. A., SOKOLOV, S. V., GRINBLAT, M. P. and MELESHKEVICH, V. P., (All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev)

[Abstract] New elastomers (SKTF and SF) being synthesized at the institute are insoluble in saturated and aromatic hydrocarbons as well as in cyclic ethers and esters and are superior to rubber A-100 in heat resistance and frost resistance. Vulcanizates from SKTF and SF are equal to vulcanized A-100 rubbers in heat resistance and are superior to them in resistance to organic solvents and in maintenance of their elastic properties at -60° to 70°C.

[130-2791]

UDC (678.742.2-139+678.762.2-134.352), 063.002.612

EFFECT OF THE TYPE OF SKEPT ON THE PROPERTIES OF RUBBERS BASED ON A COMBINATION OF IT AND BUTADIENENITRILE RUBBER

Moscow KAUCHUK I REZINA in Russian No 2, 1980 signed to press 31 Jan 80
submitted 8 Jan 79 p 12

PLEKHANOVA, A. L., CHEKANOVA, A. A. and ZAKHAROV, N. D. (Yaroslav Polytechnical Institute)

[Abstract] A study of properties of resins based on a combination of butadienenitrile rubber SKN-40M and SKEPT polymer containing as a third comonomer dicyclopentadiene (DTSPD) and ethylidene norbornene (ENB) showed that use of ENB as the third comonomer in SKEPT increases the strength of the vulcanized rubbers probably due to the increase of the rate of vulcanization of the SKEPT phase. The fatigue limit of rubbers containing SKEPT and DTSPD is higher than that containing SKEPT and ENB. The degree of vulcanization of SKEPT with DTSPD phase is lower than that in highly unsaturated rubber. Selection of the rigidity of SKEPT and the type of the third copolymer in it makes possible regulation of properties of rubbers based on its combination with SKN-40M during use of an ordinary vulcanization system. References 5: 3 Russian, 2 Western.

[130-2791]

PECULIARITIES OF INHIBITION OF NITRO-HARDENING OF BUTYL RUBBER BY SPATIALLY
HINDERED PHENOLS

Moscow KAUCHUK I REZINA in Russian No 2, 1980 signed to press 31 Jan 80
submitted 3 May 79 pp 13-16

ZORIK, V. V., KOMAROV, V. F., KOROLEV, G. V. and GURVICH, YA. A.

[Abstract] The kinetics of the reaction of vulcanization of butyl rubber by an $n\text{-XDO-MnO}_2$ system inhibited by substituted phenol was studied. In the presence of 2,4,6-highly inhibited phenols after the induction period, the rate of hardening of the rubber and the thickness of the cross links increased due to formation of active intermediate compounds--quinol ethers. A mechanism of inhibited vulcanization of butyl ether was presented. References 7: 5 Russian, 2 Western.
[130-2791]

A NEW PRE-CURING INHIBITOR OF RUBBER MIXTURES BASED ON SKN-40M

Moscow KAUCHUK I REZINA in Russian No 2, 1980 signed to press 31 Jan 80
submitted 12 Dec 78 pp 28-29

MISHIYEV, R. D., SALKHOV, M. S., AKHMEDOV, G. G. and BABEYEV, R. KH., Institute of Organochlorine Syntheses of the Azerbaijan SSR Academy of Sciences

[Abstract] A study of the possibility for use as a pre-vulcanization inhibitor of rubber mixtures based on SKN-40M of a polyfunctional compound, the structure of which contains a chlorine atom, an ethylene and epoxy bonds and also carboxylic groups--1, 8, 9, 10, 11, 11-hexachlorotricyclo [6.2.1.0^{2,7}] undetz-9-cene-3.6-epoxy-4.5-dicarboxylic acid, synthesized from furan, maleic anhydride and hexachlorocyclopentadiene by the Diels Alder reaction with subsequent boiling in water of the anhydride produced indicated that introduction of a small quantity of chlorine containing dicarboxylic acid (0.5 - 3.0 mass. parts) increased the pre-curing time of the rubber mixture occurred from 35 to 50-51 minutes. The mechanical properties of the rubbers and their resistance to heat aging and the degree of vulcanization also were improved. This effective pre-curing inhibitor of the rubber mix based on SKN-40M is technologically efficient. References 7: 6 Russian, 1 Western.
[130-2791]

ACCELERATION OF VULCANIZATION OF CHLOROPRENE RUBBER BY 2-MERCAPTO-DERIVATIVES OF IMIDAZOLE

Moscow KAUCHUK I REZINA in Russian No 2, 1980 signed to press 31 Jan 80
submitted 5 Nov 79 pp 29-31

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[Abstract] A study of the possibility of use as accelerators of vulcanization of chloroprene rubber by 2-mercaptoderivatives of imidazole - 2-mercapto-4-phenylimidazolidine (4FI), 2-mercapto-5-phenylimidazole (5FI) and 2,3,5,6-tetrahydro-6-phenylimidazole (2,1, beta) thiazole (TGFIT) indicated that these new accelerators ensure higher strength and greater resistance to vulcanization reversion of filled rubbers than NA-22. The properties of these rubbers are good, being superior to resins with NA-22 and resins without an accelerator in resistance to heat aging and swelling. Figures 2.
[130-2791]

COPOLYMERIZATION OF BUTADIENE AND ISOPRENE WITH THEIR LINEAR AND CYCLIC DIMERS WITH THE AID OF ZIEGLER-NATTA CATALYSTS

Moscow VYSOKOMOLEKYLARNYYE SOYEDINENIYA in Russian No 2, 1980 pp 385-389
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MONAKOV, YU. B., GLUKHOV, YE. A., FARKHIYEVA, I. T., KUDASHEV, R. KH.,
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[Abstract] The copolymerization of butadiene with 3-methylheptatriene-1,4, 6 and 1,3,6-octatriene in the presence of the cis- and trans-regulating systems $TiI_2Cl_2 + Al(iso-C_4H_9)_3$ and $TiCl_4 + Al(iso-C_4H_9)_3$, respectively was investigated, as was the copolymerization of isoprene with 2,6-dimethyl-octatriene-1,3,6 and its dimeric analogues in the presence of the system $TiCl_4 + (iso-C_4H_9)_3$. The polymers thus synthesized were found to display a random distribution of monomeric links in the chain. The addition of triene to the basic chain proceeds through the mechanism of a conjugate system of double bonds. The observed inversion of the activities of the investigated dimers upon their copolymerization with butadiene and isoprene in the presence of the

coordination systems is due to the structural features of the diene and of the reactive linear triene with a conjugate system of double bonds, and in particular it is due to the presence of the CH_3 side group. Figures 2; references 21: 14 Russian, 7 Western.
[122-1386]

UDC 631.84:661.717.5

RECOVERY OF CARBAMIDE-FORMALDEHYDE FERTILIZERS FROM CONCENTRATED SOLUTIONS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1980 pp 22-24

KUZNETSOVA, A. YE. and TARKHANOVA, L. S.

[Abstract] The authors developed a method for producing carbamide-formaldehyde fertilizers (CFF) from solutions of carbamide in formalin. They describe a continuous CFF production process, including a reproduction of the flow diagram, and demonstrate that their method compares favorably to others: shorter reaction time, elimination of filtration and neutralization stage, easier removal of methanol, no discharge or gas blow-out; the waste consists of a vapor condensate most of which is utilized. The process is in current use on an experimental production basis (since 1978) at the Vakhsh Nitrogen Fertilizer Plant with a yield of 10,000 tons per year and there are plans to produce CFF on an industrial scale after refinement of the process, with projected output of 200,000 tons per year, and projected economic effectiveness of 210 rubles per year per ton CFF used on cotton plants. Figures 1; references: 5 Russian.
[135-10,657]

UDC [661.635.213+661.635.223].002.612.3

AMMOPHOS PRODUCTION INVOLVED DECREASED OUTLAY OF PHOSPHORIC ACID

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1980 pp 24-25

ZOLOTAREV, N. N., LETICHEVSKAYA, N. N., KARPOVICH, L. M., VLEZ'KO, V. P., GELETA, I. A. and BARABASH, I. P.

[Abstract] Tests were conducted at the Sumi division of Khimprom to produce ammophos [ammonium phosphate fertilizer] from phosphoric acid to verify the report based on laboratory tests that less phosphoric acid could be used for this purpose than previously used in industry, with resulting lowering of cost and improvement of fertilizer properties. Apatite was added to phosphoric acid as a replacement of part of the latter, and it was found to yield a 16.2% increase in productivity along with decrease in use of phosphoric acid; the fertilizer obtained meets current specifications. References: 3 Russian.

[135-10,657]

UDC 66.097.3-965.1:661.53

EXPERIMENTAL PRODUCTION TESTING OF GRANULATED CATALYST FOR AMMONIA SYNTHESIS BY THE METHOD OF CONTINUOUS MELTING

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1980 pp 32-34

MEN'SHOV, V. N., ANOKHIN, V. N., LYTIN, V. P., SOBOLEVSKIY, V. S. and ZUYEV, A. A.

[Abstract] Since catalytic synthesis from air nitrogen and hydrogen at high pressure is the most profitable method of recovering ammonia, the authors developed, tested and refined a continuous and safe technique for producing granulated, melted iron catalyst for such synthesis that has advantages over the granulation process in liquid. The chemical composition, activity, mechanical strength of SA-1, SA-1G in current use are compared to these properties of a new granulated catalyst, SA-1P. Equations are included for determination of rate of ammonia synthesis, concentration of ammonia in reactive gas, rates of diffusion and catalytic reaction, material balance, with demonstration of superiority of SA-1P. This work was done on an experimental production installation. Figures 4; references: 4 Russian.

[135-10,657]

INFLUENCE OF FLOW VELOCITY PROFILE IN CATALYST LAYER ON EFFICIENCY OF
AMMONIA SYNTHESIS REACTOR

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1980 pp 41-42

KRASNUSHKINA, N. V., DIL'MAN, V. V. and SERGEYEV, S. P.

[Abstract] Calculations were made, equations for which are submitted, of reactor properties (material and thermal balance; rate of ammonia synthesis, loss of reactor efficiency due to uneven distribution of velocities in catalyst; dispersion) and how they are affected by the flow velocity profile of the catalyst bed [layer]. Figures 2; references: 7 Russian. [135-10,657]

DECONTAMINATION OF SEVIN-CONTAINING WASTE WATERS

Moscow KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 2 No 1, 1980 pp 25-30
manuscript received 6 Jul 79

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[Abstract] Sevin (1-naphthyl-N-methyl carbamate) is at present widely used in agriculture as pesticide instead of persistent organochlorine compounds. In the process of its production, diluted waste waters are formed which in addition to Sevin and its metabolite, α -naphthol, include a number of nitrogen-bearing compounds. In accordance with sanitary requirements, the maximum permissible concentration of sevin in water is 0.1 mg/l and oxidability of effluents should not exceed 10 mg O₂/l. Sevin-containing waste waters, prior to their discharge or chemical treatment, should be decontaminated, but the effective methods for their purification were not yet worked out. The expensive high-temperature incineration cannot be applied because of Sevin's resistance to high temperatures. On the other hand, methods of chemical oxidation are in wide use at present. The authors studied (1975) the action of various oxidants (ozone, chlorine, hydrogen peroxide, potassium permanganate) on aqueous solutions of Sevin and established that ozone is more effective than other agents and that its unit consumption necessary for complete decomposition of Sevin in water is 0.5 per mg of organic substance. Toxicological investigations of destruction products of Sevin showed that they are nontoxic and noncumulative. Experiments on purification of Sevin-containing waste waters by ozone were carried out on model solutions imitating effluents from washing floors in pesticide-producing enterprises. The composition of these effluents at permanganate oxidability of 105 mg O₂/l was as follows: Sevin 20, α -naphthol 10, dimethylaniline 10 triethylamine 20, and dimethylurea 10. The degree of decontamination was determined from the content of the most toxic component, Sevin, using thin-layer chromatography, and from oxidability of the solution in the process of its treatment. Ozonization was performed in a bubbling-type ozonizer and the amount of ozone absorbed was determined iodometrically. The destruction of investigated compounds in water is determined by their nature and by the rate of ozone inflow into the reaction vessel. The required thoroughness of purification was achieved with the use of 240 mg/l of ozone and the unit

expense of ozone was 2.4 mg per mg of organic substance. The magnitude of permanganate oxidability of the effluent treated did not exceed 10 mg O_2/l and the content of Sevin was less than 0.1 mg/l. Analogous experiments were also carried out using a flow-through bubbling column. As the ozonization proceeded the factor of ozone utilization decreased from 80% to 45%. To reduce losses of the oxidant its reuse is recommended by means of a system of recuperation. Based on the results obtained, a process flow diagram for purification of Sevin-containing waste waters with the use of an OP-121 ozone generator is proposed. The cost of the treatment of Sevin-containing effluents will be 0.1 rouble per m^3 . Figures 3; table 1; references 7: 6 Russian, 1 Western.
[126-1015]

UDC 628.165

DEMINERALIZATION OF SOFTENED WATER BY ELECTRODIALYSIS WITH SIMULTANEOUS PRODUCTION OF HIGHLY CONCENTRATED BRINE

Moscow KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 2 No 1, 1980 pp 36-38
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GREBENYUK, V. D., PISARUK, V. I., STRIZHAK, N. P., PENKALO, I. I. and VOLOSHINA, A. L., Institute of Colloid Chemistry and Chemistry of Water, UkSSR Academy of Sciences, Kiev

[Abstract] The creation of an ED-60 electrodialyzing demineralizer-concentrator, in which the complete hermetization of the brine tract in relation to the demineralization tract has been achieved and a system of the supply and discharge of the solution in the brine tract ensures minimization of current leakages in the brine, has made it possible to carry out the operations of comprehensive treatment of the mine waters, while simultaneously producing a highly concentrated brine. To ensure steady operation of electrodialyzer nothing remains but to exclude the sludging in concentration chambers. $CaSO_4$ is one of the most characteristic sediments that are formed in the process of electrodialysis. The authors studied an imitation of the softened "Petrovskaya" mine water of the following composition: $NaCl$ and Na_2SO_4 - 2.9-2.0 g/l respectively, $CaCl_2$ -5.5 g/l, degree of softening - 200, which is achieved in the preliminary stages of treatment and is determined by the value of the maximum permissible concentration of calcium, which excludes the formation of calcium sulfate in the brine chambers. Preliminary verification of the steadiness of demineralization process with simultaneous high brine concentration was performed using a laboratory electrodialyzer (one concentration chamber and two desalting chambers) under

direct-flow operating conditions and flow velocity of solution in demineralization tract equal to 0.3 cm/sec. The area of ion-exchange membranes was 0.1 dm² and the intermembrane spacing 5 mm. The electrodialyzer was made to work for about 300 hrs (7 hrs a day). It has been found that no changes occurred in the basic physicochemical properties of ion-exchange membranes and no sediments were detected on them. Since there was a possibility that in the course of the 7-hour work of the electrodialyzer the formation could occur of the crystal nuclei on the ion-exchange membranes and that their dissolution might take place during the subsequent 17-hour interval, a 32-hour nonstop test of the electrodialyzer work was carried out and no significant changes in its performance were ascertained. Thus, it has been demonstrated that it is possible in principle to perform demineralization with simultaneous production of highly concentrated brine using a single electrodialyzer, at small expenditures of energy and sufficiently high current efficiency, under conditions of complete hermetization of demineralization and concentration tracts, minimization of current leakages in the brine and prevention of the formation of difficult-to-dissolve compounds in concentration chambers. Tables 2; references: 4 Russian. [126-1015]

UDC 628.16:661.63

PURIFICATION OF NATURAL WATERS FROM ORGANOPHOSPHORUS INSECTICIDES

Moscow KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 2 No 1, 1980 pp 44-46
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[Abstract] The widespread use of the organophosphorus compounds (OPC) in agriculture for the protection of plants has created a danger of the pollution by them of water supplies. A previous investigation by the authors showed that traditional methods of bleaching and clarification of water do not fully eliminate them. The treatment with potassium permanganate and superchlorination may destroy odors but the danger of the accumulation of toxic substances remains. It has been established that ozonization is the most effective way to eliminate the OPC without formation of the intermediate products. The present investigation was to verify three process flow diagrams of the treatment of water with ozone in order to eliminate the OPC from natural waters. The water studied was taken from the Kiev storage basin, into which the OPC were introduced. The ozone-air mixture was produced from air oxygen in the field of quiet electric discharge using a

laboratory ozonizer. The contact between the ozone-air mixture and investigated solution was achieved in a bubbling glass column and the ozone concentration was determined iodometrically. The qualitative indices and the content of insecticides were determined using thin-layer chromatography and from the content of phosphorus determined in the form of a blue heteropoly complex after extraction of the OPC with chloroform and mineralization. To study the possibility of the use of ozone as a single method of purification, the experiments were carried out on natural water having chromaticity grade 91 (by the bichromate-cobalt scale), pH 6.75 and chlorophos [trichlorphon] content in the amount of 5-7 mg/l. As has been already established earlier, chlorophos in diluted aqueous solutions does not interact with ozone. To detoxicate it, one should first convert it to dichlorophos [ditrichlorphon], which can be achieved through the increase of pH to 8.5-9.0. In separate experiments it was established that the overall hydrolysis and conversion of chlorophos to dichlorophos require 30 min. In another series of experiments the elimination was studied of the OPC from water with ozone after its previous chlorination and coagulation. To this water added were 1 mg/l each of chlorophos, metaphos [parathion-methyl] and carbophos [malathion], and left to stand for 30 min until the completion of hydrolysis of chlorophos, whereafter it was treated with chlorine (8 mg/l), coagulant (40 mg/l, to decrease chromaticity by 50%) and ozone (10 and 20 mg/l), for 10 min. In this case, ozonization permits a decrease of the content of the OPC to 0.01 mg/l (maximum permissible amount) and the bringing chromaticity to normal with much smaller amount of coagulant. The third series of experiments dealt with elimination of the OPC with ozone (5-10 mg/l) after the treatment of water with chlorine (5 mg/l) and coagulant (80 mg/l), as well as after its settling and filtration. The results obtained show that the use of ozone at the end of the process flow diagram after elimination of the main mass of organic substances brings about a destruction of the OPC with lesser expense of oxidant. Under practical conditions it may be necessary to eliminate the residue of the OPC from water containing various organic substances formed, for example because of waterbloom. Such water was modeled by adding from 0.5 to 1 mg/l of indole, phenol, amines, sulfur compounds, volatile acids, synthetic surface-active substances and OPC. Investigated water was chlorinated (5 mg/l), treated with coagulant (aluminum sulfate, 100 mg/l), and filtered, to eliminate colloid impurities, and treated with various doses of ozone for 10-20 min. Before addition of ozone the concentration of OPC practically did not change. Only after addition of ozone its concentration considerably decreased and at more than 20 mg/l it reached the MPC level. The overall elimination of the OPC was observed at a dose of ozone of about 50 mg/l. We may conclude that ozonization may be applied to eliminate the residue of the OPC from natural waters at ozone dose of 20 mg/l, pH 8-8.5, and 10 min duration of treatment. Tables 3; references: 9 Russian.
[126-1015]

UTILIZATION OF FOSSIL COALS FOR WATER PURIFICATION FROM HYDROCARBONS

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ETTINGER, I. L., SHUL'MAN, N. V., RADCHENKO, S. A., SHLAPAKOVA, E. I. and MURZAGULOVA, YE. A., Institute for Problems of Comprehensive Mastery of Mineral Resources, USSR Academy of Sciences, Moscow; Tula Polytechnical Institute; Ufa Petroleum Institute

[Abstract] The necessity to protect our environment from pollution has considerably increased the need for adsorbents to purify air and water. In the United States the production of the activated carbon reached 130-140,000, in Holland 35,000, and in Japan 47,000 tons annually. But the activated carbon has significant shortcomings--its little durability and high cost. Therefore, the possibility of utilization of the inexpensive natural coals for purification of industrial effluents, or for their additional purification after other methods were employed, has been of a long-standing interest for scientists. This idea was periodically discussed in the scientific press without much practical results so far, which was due to the fact that coals were used without taking into consideration their porous structure. The authors studied three parameters of several hundreds of various fossil coals characterizing porous sorbents: the magnitude of openings and the size of pores and their diameterwise distribution. In the overwhelming majority of coals their specific surface, determined by low-temperature adsorption of nitrogen acc. to Brunauer, Emmett and Teller (BET) method, was less than $0.5 \text{ m}^2/\text{g}$, which pointed to an insignificant number of meso- and micropores. The size of pores determined by molecular probe method was found to be equal to 4-5 Å. At these parameters of the sorbent only absorption can occur, for adsorption cannot take place due to the absence of structural interface. Hence one would conclude that the fossil coals cannot be used for purification of industrial effluents from macromolecular pollutants. However, among the little-metamorphosed (long-flame) coals there are varieties which display on their differential curve of pore distribution a second (after micropores) maximum, in which the size of the inlet holes of pores is equal diameterwise to 40 Å, that is that of mesopores. Such coals were named "mesoporous" by the authors. They constitute natural molecular sieves suitable for purification of waters from high-molecular compounds. Unlike other coals, the specific surface of mesoporous coals determined by the BET method is rather considerable ($100\text{-}150 \text{ m}^2/\text{g}$) even if it is inferior in size to that of the macroporous activated carbon ($1000 \text{ m}^2/\text{g}$). The advantage of the mesoporous fossil coals as natural molecular sieves is that they can replace the scarce and expensive activated carbon and because of their cheapness (18-20 rubles/ton) do not require regeneration. After they were used as water purifiers they can be burned together with ordinary coals, while their calorificity is enhanced due to the retention of organic

compounds. The mesoporous coals were found by the authors to exist in the Donetsk coal basin and in Georgia. The best way to detect them is by using the method of determination of their specific surface from the low-temperature adsorption of nitrogen. The magnitude of the specific surface equal to tens and hundreds of square meters indicates that these coals can be used as molecular sieves. Overall, in the Soviet Union, the reserves of the long-flame coals, including those suitable for water purification, amount to tens of billions tons. The laboratory experiments have established that slightly metamorphosed mesoporous fossil coals are suitable for purification of various industrial effluents from high-molecular organic compounds. Their trials on a semi-industrial scale are being carried on at present. References 8: 7 Russian, 1 Western.
[126-1015]

CSO: 1841

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